

STEALING THE ATOM BOMB

Roger J. Mattson

UNITED STATES GOVERNMENT
Memorandum

DIRECTOR, FBI (117-2564) DATE: 9/11/68

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Subject: [REDACTED] b7c/3
ATOMIC ENERGY ACT (b)(1)(A)

APPROPRIATE AGENCIES AND FIELD OFFICES ADVISED BY ROUTING SLIP (S) OF DATE 7/9/80

Re WFOlet 8/5/68. Classified by 5445 LBY/9
Declassify on: OADR 7-25-95

Undersigned Per DOE letter 4-16-85 + 6-4-85 On 9/6/68, [REDACTED] Security Office, ABC, Germantown, Md., advised that the ABC Security Office in NYC had contacted him that date to advise of the requested visit on 9/10/68, to NUPEC, Apollo, Pa., by the following:

AVRAHAM HERMONI, Scientific Counselor, Israeli Embassy, Washington, D. C.;

Dr. EPHRAIM BEIGON, Dept. of Electronics, Israel, born 7/15/32, in London;

ABRAHAM BENDOR, Dept. of Electronics, Israel, born 7/7/28, in Israel;

RAPHAEL EITAN, Chemist, Ministry of Defense, Israel, born 11/23/26, in Israel.

[REDACTED]

② - Bureau
2 - Pittsburgh [REDACTED] WFO REC 57
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HOW DENIAL AND
DECEPTION ARMED ISRAEL

STEALING THE ATOM BOMB

HOW DENIAL AND DECEPTION ARMED ISRAEL

Roger J. Mattson

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The document on the front cover is from FBI files.

The FBI redacted it before release.

It contains the names of the four Israeli spies who visited NUMEC on September 10, 1968,

What Readers Said About *Stealing the Atom Bomb*

“Mattson was known at NRC for his direct manner and willingness to voice unvarnished opinions. He has done it again in this very interesting book—the research is most impressive.” J. Samuel Walker, former historian of the Nuclear Regulatory Commission and author of *Three Mile Island: A Nuclear Crisis in Historical Perspective*.

“As the possible spread of nuclear weapons continues to trouble the Middle East, this extensively documented book is a timely reminder that nuclear proliferation began there, in Israel, in the 1960s. Mattson’s meticulous research spotlights the core question for Americans: why, in 2016, are U.S. intelligence agencies still trying to hide how Israel obtained U.S. Navy uranium to make its first bombs?” Margaret Ryan, former editor (1986-2008) of *Nucleonics Week*.

“What a painstaking book! It needed to be done and Mattson hit the right reason, which is the moral one. This is a mighty work about tragic legal and political failings that will inform curious people for generations.” John Fialka, former reporter on intelligence, military and energy for the *Wall Street Journal* and the *Washington Star*.

“This book is painstakingly researched and gracefully written. I am floored, really, at its portrait of my father; I can almost feel his ironic gratitude to the author. I see here the careful balance my father maintained, reckless forces all around, guided by his own principles.” John Hadden, playwright, director, actor, teacher and author of *Conversations with a Masked Man: My Father, the CIA, and Me*.

“*Stealing the Atom Bomb* is the definitive book about how and why a team of spies and their American associate diverted U.S. weapons-grade uranium into the Israeli nuclear weapons program—and why the American government never did anything about it.” Grant F. Smith, director of the Institute for Research: Middle Eastern Policy and author of *Divert!*

“No one has done a more thorough analysis of the disappearance of bomb-grade uranium from a U.S. plant in the 1960s, and the evidence points to an Israeli operation.” Victor Gilinsky, former Commissioner of the Nuclear Regulatory Commission.

“This is the most authoritative account of the 1960s diversion from the United States of highly enriched uranium that was used to accelerate Israel’s nuclear weapons program. In meticulous detail, citing hundreds of internal U.S. government documents, Mattson exposes the lies of senior U.S. and Israeli government officials in their efforts to cover up the diversion and protect the perpetrators; and he reveals how the CIA continues to needlessly classify 40 to 50 year old documents that could give U.S. citizens and federal authorities a full accounting of this shameful blotch on our government’s conduct.” Thomas B. Cochran, Ph.D.

“This is a well written, important book. How did Israel become a nuclear weapons state and what roles, if any, did U.S. government agencies and political leaders play? Mattson’s book provides a major resource to those seeking answers to these questions.” William Dircks, former Executive Director for Operations, Nuclear Regulatory Commission.

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Acknowledgements

Writing this book required help. Primary among the helpers were Dr. Victor Gilinsky and the late Dr. Henry Myers who followed much of the same trail as I in the 1970s, and then helped to sort out the facts and commented on drafts en route to this final product. Grant Smith aided my work by commenting on drafts, persisting in appeals of the many document denials by CIA and FBI and researching the life of David Lowenthal, the origins of Apollo Industries and the reach of the Israel Lobby. The archivists and FOIA specialists at various libraries and government agencies were professional and helpful. Thanks also to friends and family who read drafts of the manuscript and made helpful comments. At the top of the list of contributors is Donna Mattson who was there from the investigations in the 1970s to the writing of this book, not just to encourage, empathize and edit, but also to help recall the facts of the case and the people of the AEC in the 1960s.

Previous accounts of the NUMEC affair include the book *Divert* by Grant F. Smith, an investigative reporter and author who heads the Institute for Research: Middle East Policy. Victor Gilinsky and I wrote two articles that were published in the *Bulletin of the Atomic Scientists* to describe the likely fate and the coverup of the missing uranium at Apollo. The reports of journalists David Burnham of the *New York Times* and John Fialka of the *Washington Star* tracked the story as it first unfolded in the public domain in the late 1970s. This account draws upon those earlier efforts, which are acknowledged with gratitude.

Much is owed to the reviewers of the manuscript for their wisdom and the course corrections they suggested. They included David Burnham, Thomas Cochran, Avner Cohen, William Dircks, John Fialka, Victor Gilinsky, John Hadden, Jack Newman, Margaret Ryan, Samuel Walker and Leonard Weiss. A special thanks to J. B. Rivard for the suggestions I heeded and the ones I did not.

The photos and graphics are in the public domain.

Mistakes that remain are mine.

Preface

In March 1976, General Brent Scowcroft, National Security Advisor to President Gerald Ford, hastily convened a meeting of the National Security Council staff. Scowcroft called the meeting to address the concern of Commissioner Marcus Rowden of the Nuclear Regulatory Commission (NRC) that some younger members of the NRC staff were about to “spill the beans” about an American company called NUMEC. Rowden’s alarm stemmed from a briefing of NRC officials by a high-ranking official of the Central Intelligence Agency (CIA) that occurred just days before. The CIA official told NRC for the first time of CIA’s conclusion of nearly a decade before that NUMEC was the source of highly enriched uranium that aided startup of Israel’s nuclear weapons program.

The NRC people were stunned to learn of CIA’s conclusion, not least because NUMEC was one of their licensees. More importantly, the new information from CIA confirmed what a senior NRC staff member, James Conran, had been trying to tell his managers for months. He had stumbled on similar information about NUMEC in the files of the former Atomic Energy Commission (AEC). The Energy Research and Development Administration (ERDA) inherited those files when AEC was abolished in 1975. The ERDA people were determined to keep the NUMEC files away from the NRC, which had also spun off from the old AEC. Because his NRC managers did not heed his concerns, Conran was about to go public and blow the whistle that his work was being impeded by an inappropriate claim that he had no “need to know.” Rowden asked for the NSC meeting to discuss how to contain the spread of what he secretly knew to be damning information about the relationship among NUMEC, America’s nuclear program and Israel’s nuclear program. The meeting led to nearly forty more years of official denial and obfuscation of the NUMEC affair, a situation that continues to this day.

The account presented in this book is the product of a perennial preoccupation with the NUMEC affair. My first knowledge of it dawned in April 1977 with an early morning phone call from Rowden, by then the Chairman of the NRC. He sent me on a short-term mission that grew to occupy my private thoughts, haunt too many sleepless nights and guide my persistent inquiry for nearly 40 years. Although I am an advocate of nuclear power, believing it to be an essential ingredient of our deliverance from the death-dealing grip of fossil fuels, it is time for this affair to become more widely known.

My journey on the path to embracing the CIA’s conclusion about NUMEC started innocently enough: Rowden wanted me to lead a team of NRC security experts to respond to charges made by our whistle-blowing colleague, James Conran. As a senior staff member in the safeguards organization of the NRC, Jim and his colleagues were then and are now the people that ensure commercial nuclear facilities, materials, and know-how don’t fall into the wrong hands. Just two days before Rowden’s call, on April 4, 1977, Conran sent open letters to the NRC, President Jimmy Carter and Representative Morris Udall (D-AZ), the head of NRC’s oversight committee in the U.S. House of Representatives. Conran claimed, among other things, that highly enriched uranium, a material used in making nuclear weapons, had gone missing from the Apollo Plant of the Nuclear Materials and Equipment Corporation (NUMEC). He said suspicious circumstances surrounded the disappearance of the material more than a decade earlier when it was regulated by the AEC. He also claimed that intelligence agencies had hidden

the facts from him, the recently created NRC and the public.

Over the next few weeks, my five-man team of NRC experts learned that Conran was correct in many of his allegations, including the possibility that the missing uranium was diverted to Israel. Years later, as evidence continued to mount, it became clear that responsibility for covering up the possibility of such a diversion, if not for the act itself, extended to the highest offices in the nation. As a result, our government failed to prosecute its citizens who aided a foreign nation in acquiring nuclear weapons. Our government failed in this responsibility at the same time it was advocating implementation of the international Treaty on the Nonproliferation of Nuclear Weapons (NPT) to stave off such possibilities.

While that fact is shocking, it is not the whole story. Our government has failed for reasons of political expedience and ineptitude to stop the spread of nuclear weapons on other occasions. India, Pakistan and North Korea lead that list. By failing to adequately support the cause of nonproliferation, our government has knowingly aided, abetted or abided the acquisition of nuclear weapons by politically unstable countries and unsavory regimes with which it sought to curry favor. Our leaders not only covered up these nuclear misdeeds, they also failed to make meaningful progress toward nuclear disarmament as America promised to do when it signed the NPT more than forty years ago.

The theft of uranium from Apollo in the 1960s heralded the advent of a large and growing threat that transcends the nuclear madness of the Cold War. That threat is the spread of nuclear weapons to unstable states and thence to subnational terror groups. To help get our nation more firmly on course toward nuclear disarmament, where its opinions count in the international debate, it is time for our government to admit fully its knowledge of and involvement in the NUMEC affair. To help create the will for such atonement, I have written this account to tell what I learned by peering through veils woven by others to hide the truth.

Here is the story in simple terms. Beginning more than 50 years ago, and extending over the period from 1957 to 1978, according to official U.S. government records and studies, more than 300 kilograms of uranium 235 (U-235) in the form of highly enriched uranium (HEU) went missing from a nuclear fuel manufacturing plant in the tiny town of Apollo, Pennsylvania. Some of the missing material could be accounted for by normal losses, but some could not. It now seems clear that early in that period, foreign agents, perhaps aided by American citizens, diverted a significant fraction of the missing uranium to Israel to jump-start its fledgling nuclear-weapons program. Because of the enormously high stakes involved in the public becoming aware of the illicit transfer of this basic ingredient of nuclear weapons to a foreign country, the affair has been clouded in denial and deception for 50 years.

NUMEC owned the Apollo uranium plant. A celebrated Zionist, David Lowenthal, financed the startup of the company in 1957. In the late 1940s, Lowenthal was associated with organizations that helped to establish the state of Israel. One of his partners in the NUMEC startup was Dr. Zalman Mordecai Shapiro, a leading American metallurgist and another dedicated Zionist. Dr. Shapiro designed, built and oversaw operation of the Apollo plant until the early 1970s. The plant began manufacturing fuel for nuclear reactors in 1959. It processed many tons of uranium in its lifetime, reaching a peak annual throughput

of more than 700 metric tons in 1973.

In early 1965, the AEC's Oak Ridge Operations Office in Tennessee conducted a routine inventory of government-owned HEU that had been leased to NUMEC. As the Oak Ridge people suspected, based on past concerns, the inventory disclosed a significant shortage. In early 1966, after extensive investigations, and accounting for all conceivable operating losses, the AEC confirmed that 178 kilograms of U-235 were missing from the Apollo uranium plant. The missing uranium was in the form of HEU, the main ingredient for uranium-fueled atom bombs. Within three years, the amount of missing U-235 in the form of HEU grew to 269 kilograms.

Although the AEC, its successor agency the NRC, the Federal Bureau of Investigation (FBI), the Justice Department, the CIA, the Congressional Joint Committee on Atomic Energy, the General Accounting Office, the National Security Council, the Defense Intelligence Agency, two committees of the U.S. House of Representatives and four presidential administrations purported to investigate what became of the missing uranium, they never found or recovered it. The investigations extended over the period from 1965 to the early 1980s. The investigators all acknowledged that the material might have made its way to Israel, and some in high position were certain it went there, but, until recently, hard evidence of a diversion was veiled in secrecy and hard to find.

Today, more is known about the NUMEC affair than ever before. The FBI has released an account of a detailed statement in 1980 by a former NUMEC employee who said he encountered armed strangers on the uranium plant's loading dock one night in early 1965. He said they were loading what appeared to be canisters of HEU onto a truck in racks that he had not been seen before and were heading to a ship bound for Israel. He said that a NUMEC manager later threatened him to keep his mouth shut, or else. In addition, the CIA recently released documents that appear to corroborate the claim that it found HEU from the United States in 1968 near the Israeli nuclear weapons manufacturing site at Dimona. Furthermore, a trove of documents in the estate of John Hadden, former CIA station chief in Tel Aviv, provides insights to what CIA knew about NUMEC in the mid to late 1960s. Finally, it is now clear that Zalman Shapiro, throughout the time he headed NUMEC, collaborated with a number of Israeli intelligence agents dedicated to the acquisition of nuclear secrets from the United States.

As the leader of the NRC team that investigated Conran's allegations, I have taken a keen interest in the tortuous trails left by the various investigations of NUMEC, from the 1960s to the 1980s, as their results slowly emerged from official secrecy. This account draws on declassified documents from the U.S. government and the insights of historians, former government officials and investigative journalists. It presents more information about the diversion of secrets and materials to Israel from NUMEC than anything previously written on the subject.

Because it has happened in numerous cases and has gone unacknowledged, the clandestine transfer of sensitive nuclear expertise and materials to surreptitious nuclear weapons programs can happen again. Furthermore, although this account is limited to the facts surrounding NUMEC, other nations have carried out nuclear espionage, including China, India, Iran, Iraq, Libya, North Korea, Pakistan and Syria. The likelihood of nuclear espionage in the future begs for reinforcement of U.S. policy on nuclear nonproliferation

to thwart the efforts of nations and organizations that seek nuclear weapons.

As this account unfolds, it will become clear that there are general lessons to be learned from the NUMEC affair, including the difficulty of dealing with dual national allegiances in controlling nuclear proliferation, the burden imposed on the United States by the outworn Israeli policy of nuclear opacity and the unjustified use of official secrecy to block citizens from meaningful assessment of their government's actions.

This book is arranged generally in chronological order, with an occasional leap forward to see the consequences of significant events. The [first chapter](#) summarizes the early years of three government agencies that figured in the NUMEC affair, that is, the FBI, the CIA and the AEC. The [second chapter](#) summarizes the origins and early accomplishments of the Israeli nuclear weapons program. With this background, the narrative turns to the late 1950s, when Zalman Shapiro incorporated NUMEC, and then traces the years in which HEU went missing from NUMEC's Apollo plant. The account continues through the administrations of four U.S. presidents that investigated the affair while perpetuating the government's secrecy and concludes with a summary of alternative views on what happened and who did it. The saga is at times difficult to follow because of the protracted and at times random declassification and release of documents. Thus, it was not unusual for information to emerge about an event a decade or more after it occurred. To aid with that complexity, frequent dates are provided to guide readers through the maze.

The chronicle includes contextual information about the history of nuclear weapons, international espionage and nuclear arms diplomacy to aid understanding of the characters and policies that figured in the NUMEC affair. A Bibliography lists the books written by others that served as sources, while Endnotes identify insights and facts gained from those books and other sources.

I prepared this Second Edition of the book to provide a better Index and to correct minor typographical errors.

Roger J. Mattson
Golden, Colorado
July 2016

STEALING THE ATOM BOMB

HOW DENIAL AND DECEPTION ARMED ISRAEL

Part One: Prelude to Nuclear Espionage

Chapter 1

CIA, FBI and AEC from 1945 to 1965

*Human memory is the ladder on which a country and a people advance.*¹

This chapter summarizes the character and general operating principles of three government agencies that figured importantly in this account of nuclear espionage. It also introduces some of the key players in the drama that unfolds.

Two intelligence agencies figured importantly in the NUMEC affair—the Federal Bureau of Investigation (FBI) and the Central Intelligence Agency (CIA). The FBI originated as the Bureau of Investigation in the Justice Department in 1908 and acquired its current name in 1935. The U.S. Congress did not create the CIA until the late 1940s, after World War II.

Although the FBI's operations and organization were well established by the end of the World War, the CIA did not find its niche for several more years. The Agency's mission and its organization changed almost continuously during its first decade as Congress and the president reacted to the growing Soviet threat in the deepening Cold War. CIA's competitive relationship with FBI started out poorly and deteriorated during that same period. One CIA veteran recalled that CIA was “an untrammelled, anything-goes monolith that did whatever it wanted, wherever it wanted, regardless of the law ... in the ‘50s and ‘60s.”²

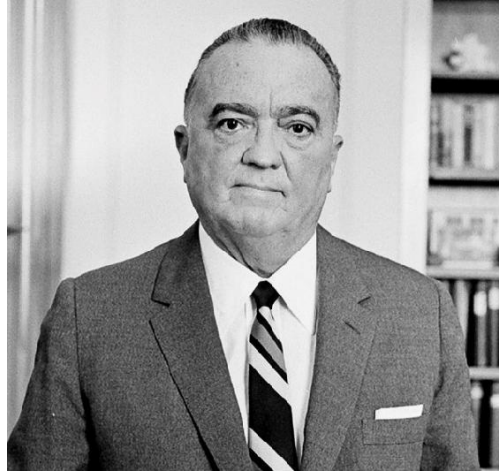
Richard Helms participated in the creation of CIA and was serving as Director of Central Intelligence (DCI) when concerns about NUMEC first arose in the CIA. He opined in his autobiography that the reasons to establish CIA were broader than the onset of the Cold War. He said the need for a permanent foreign intelligence agency arose during World War II and was heightened by the advent of the atom bomb.³

Congress and the executive branch debated for nearly two years about CIA's powers and its placement within the federal bureaucracy because opinions varied about its mission. The debate began in 1944 when President Franklin Roosevelt solicited a proposal “for an intelligence service for the postwar period.” He tasked General William “Wild Bill” Donovan, head of the wartime Office of Strategic Services (OSS), to draft a plan.

Donovan recommended a central agency to coordinate and collect foreign intelligence. J. Edgar Hoover, Director of the FBI, fought Donovan's plan and leaked it to the press, causing such uproar in Congress that Roosevelt put the plan on hold. Hoover then persuaded President Harry Truman, who succeeded Roosevelt in April 1945, to abolish OSS without creating a replacement, saying such an agency would become an “American Gestapo.”

At the time, Helms was still with OSS in Europe where Germany had surrendered on May 8, 1945. He recalled, “Those of us in Germany were taken completely by surprise on September 20, 1945, when President Harry Truman abruptly issued the executive order terminating the Office of Strategic Services ten days hence.” Helms thought Truman's actions were “more punitive than rational to expect an organization that stretched from

Washington across Europe, with elements in the Near East, Africa, China, Burma, India, and Vietnam to fold its tents, abandon its properties, and rid itself of some 11,500 employees in ten days.”⁴ Thus, by October 1945, just a month and a half after Japan surrendered and ended World War II, only a small remnant of OSS remained. Its successor, a nondescript Strategic Services Unit, was nearly invisible in the backwaters of the War Department.



J. Edgar Hoover
FBI Director
1935-1972

Hoover persisted with his own plan for foreign intelligence. His recommendations carried great weight because Congressional leaders respected his strong anti-communist record. In addition, Hoover launched what journalism professor and best-selling author Evan Thomas called “a campaign of leaks and innuendo” to discredit Donovan and to encourage Congress and the president to accept the idea that “foreign and domestic intelligence are inseparable and constitute one field of operation.”⁵

By mid November 1945, policy makers in Washington could see that Hoover’s crime-buster mentality was costing the country important information about the Soviet Union’s post-war intentions. For example, he nixed the idea of a government-sanctioned exchange of intelligence operatives with the Soviets, missing the opportunity for both countries to learn what the other was doing, thus missing the opportunity to counter negative fantasies with facts.

Truman had different concerns. He thought that the Strategic Services Unit was not strong enough to satisfy the need for intelligence information about the Soviets. He convinced the chiefs of the armed services to vest the Unit with authority to coordinate intelligence gathering by all parts of the federal government. In January 1946, as a step in that direction, He named Rear Admiral Sidney Souers as the first Director of Central Intelligence (DCI) and told him to coordinate America’s spying activities. Souers’ qualifications were meager, and he had no real power to coordinate anything. He soon left.

Truman replaced Souers with Lieutenant General Hoyt Vandenberg, a pilot and war hero. Although Vandenberg was allowed only to coordinate and not manage the efforts of America’s various intelligence organizations, he increased his power by recruiting a group of Colonels from the Pentagon to take over the intelligence budgets of Army, Navy and

State Department.⁶ Although Hoover resisted Vandenberg's strengthening of the DCI position, Truman eventually overruled him on the grounds that law enforcement and intelligence work were separate functions.

To bring a permanent settlement to the controversy, Truman, Vandenberg and White House counsel Clark Clifford drafted a CIA charter that Congress added to pending legislation called the National Security Act. The president signed it in July 1947, signaling the birth of CIA.⁷ Pulitzer-Prize-winning journalist Tim Weiner said that Allen Dulles played a significant role in creating CIA in secret testimony to a Congressional subcommittee. Dulles called for "a relatively small but elite corps of men with a passion for anonymity."⁸

Besides providing a charter for the CIA, the National Security Act of 1947 formally ordained, "a Director of Central Intelligence who shall ... serve as head of the United States intelligence community ... act as the principal adviser to the President for intelligence matters related to the national security; and ... serve as head of the Central Intelligence Agency." The Act gave CIA control over espionage and covert actions abroad. Although covert actions, such as sabotage, subversion or propaganda, were acceptable in wartime, they were controversial in peace-time and did not begin immediately.

In December 1947, the National Security Council (NSC) ordered CIA to execute "covert psychological operations designed to counter Soviet and Soviet-inspired activities."⁹ Eventually, DCIs began to interpret the "other functions and duties" clause of the National Security Act to include covert actions of other kinds and against other targets.¹

By Executive Order, NSC was to approve all covert actions undertaken by CIA, but its effectiveness in doing so varied over the years and with different presidents. History reveals that 81 major covert actions were undertaken during Truman's second term, 170 during President Eisenhower's eight-year presidency and 163 in less than three years under President John Kennedy.¹⁰ In the mid 1970s, after public revelations of abuses of covert action by both FBI and CIA, Congress required the president to approve all future covert actions.¹¹

Eventually, armed with authority to collect and analyze intelligence information and to conduct covert action, DCIs managed their human and technical resources to provide a range of services, including covert action, strategic warning, clandestine collection, independent analysis, overhead reconnaissance, support to war fighters and peace keepers, arms control verification, encouragement of democracy and counter-terrorism.

Hoover gained several important concessions during the debate over creation of CIA. One concession was that the 1947 Act did not obligate FBI to share any information with CIA unless it was essential to national security. The Act also assured that CIA would have no police, subpoena or law enforcement powers or other internal (inside the U.S.) security functions. Importantly for understanding the NUMEC affair, Hoover extracted an agreement from Vandenberg that an FBI special agent, not a CIA officer, would conduct

liaison between FBI and CIA. For the next fifty years, FBI special agents exclusively handled the liaison function.¹²

The National Security Act of 1947 gave the DCI power to take any actions necessary for protecting intelligence sources and methods from disclosure. Despite passage of open-government laws, such as the Freedom of Information Act (FOIA) in 1966, the DCI's power to withhold information has grown. In 1984, Congress amended the 1947 Act to relieve the Agency from searching its operations files because those files "almost invariably prove not to be releasable under the FOIA."¹³ The 1984 amendment placed beyond public reach most of the files of the Directorate of Operations and the Directorate for Science and Technology that could reveal the means by which foreign intelligence and counterintelligence are conducted. Exemption 3 in the Freedom of Information Act enables CIA to deny that documents exist (the so-called "Glomar" response), to withhold entire documents from public release and to black out (redact) information contained in documents that are released to the public, even documents that are a half-century-old. In addition, this power enables CIA to require FBI and other agencies to redact documents in which CIA holds equity, i.e., documents in which CIA has contributed information or has special interests or knowledge. The CIA's authority to decide what information to withhold from public disclosure still enshrouds the history of NUMEC. Only recently has the CIA released any of its equity about NUMEC under FOIA requests and Mandatory Declassification Reviews and then only in highly redacted form. Some of the most revealing information was released only recently during the course of a Federal FOIA lawsuit filed by Grant F. Smith in 2015 and still underway as this book goes to press.

The principal FBI-CIA interface issues not addressed in the 1947 Act that remained divisive for decades include limitations on activities that CIA conducts inside U.S. borders or with regard to U.S. citizens traveling abroad and the sharing of counterintelligence information between FBI and CIA. These issues created inefficiency and occasionally led to tragic consequences.

In 1948, the National Security Council formalized CIA's authority to carry out covert operations "against hostile foreign states or groups or in support of friendly foreign states or groups but which are so planned and conducted that any U.S. Government responsibility for them is not evident to unauthorized persons." The NSC also authorized a strike force called the Office of Policy Coordination (OPC) to undertake covert operations to attack the Soviet Union around the world. Frank Wisner, a hard drinking, hard charging forty-year old New York lawyer and former OSS operative, became the first head of OPC.¹⁴

In 1949, the Central Intelligence Agency Act authorized the CIA to use confidential fiscal and administrative procedures and exempted it from certain limitations on the use of Federal funds. It also freed CIA from disclosing its organization, functions, officials, titles, salaries or number of personnel employed. The Act created a program to handle defectors and other "essential aliens" who fall outside normal immigration procedures. It gave CIA authority to provide such persons with cover stories and economic support.¹⁵

In 1950, President Truman appointed the U.S. ambassador in Moscow, General Walter Bedell Smith to become DCI. Smith had been General Dwight Eisenhower's chief of staff during World War II. Smith's most important qualifications for DCI were gained during the four years after the war when he served in Moscow under the tutelage of America's leading Kremlinologist, George Kennan, architect of the postwar strategy to contain Soviet expansionism.

During Smith's tenure, the CIA created an advisory board to produce National Intelligence Estimates based on information gathered by CIA and other government agencies. Creation of the board fulfilled a primary mission of CIA to interpret intelligence information for use by policy officials and decision makers.¹⁶ Such Estimates were eventually issued concerning Israel's nuclear weapons program and evidence that materials for that program were "obtained by clandestine means," a phrase that came to have relevance in the investigations of NUMEC.

In January 1951, Smith appointed Allen Dulles as CIA's Deputy Director of Plans, the office in charge of covert operations that had been headed by Frank Wisner. Allen's brother, John Foster Dulles, soon became Secretary of State under President Eisenhower.¹⁷

One of the biggest spy cases in American history erupted on Smith's watch. The FBI had been concerned since the founding of CIA that communists had infiltrated the Agency. FBI agents often cited this possibility as a basis for their reluctance to share sensitive information with their CIA counterparts. The tables turned in 1951. Two years earlier, Hoover had befriended Harold "Kim" Philby, a senior member of MI6, Britain's foreign intelligence agency, and its newly appointed representative in Washington. Hoover courted Philby in an attempt to upstage CIA in international espionage because Philby likely would become the director of MI6. Hoover even shared secret information with Philby that he didn't share with CIA, information derived from FBI intercepts of Soviet cable traffic between Moscow and the United States, the so-called "Venona" information that indicated the existence of a Soviet agent in the British embassy in Washington.¹⁸

Philby, meanwhile, was extracting every secret he could from other senior American officials, including intelligence he gained from lunches with James Jesus Angleton, CIA's head of counterintelligence. Philby had been Angleton's mentor in London in the early days of OSS. "Once I met Philby, the world of intelligence that had once interested me consumed me," Angleton admitted.¹⁹

Philby's generosity extended broadly and his liquor flowed freely. He threw parties for CIA officers and FBI special agents at his home on Wisconsin Avenue in Washington, DC to promote camaraderie and show good will.²

When two British associates of Philby, Guy Burgess and Donald Maclean, defected from the United States to Moscow, Frank Wisner and William Harvey of CIA suspected that Philby might also be a Soviet spy. At the time, Wisner was CIA's chief of covert action, and Harvey was an ex-FBI special agent who had become one of CIA's most aggressive counterintelligence specialists, "taking the battle to the Soviets wherever possible."²⁰ They found that Philby had communist ties dating to the Spanish Civil War

and links to various failed operations of CIA and MI6. Hoover was convinced of Philby's guilt, while Angleton defended Philby's innocence. In June 1951, DCI Smith threw Philby out of the country. Philby fought the charges but soon retired from British intelligence. An inquiry by British authorities failed to generate enough evidence to prosecute him. His friends eventually reinstated him to a junior post in MI6 in Beirut, but his drinking and the mounting evidence of his disloyalty eventually caught up with him. In 1963, Philby fled to Moscow. He died there in 1988. Angleton never fully recovered from Philby's treachery. Having to admit that his British friend, hero, and mentor had been a senior KGB agent was said to have contributed to Angleton's downward spiral that ended in his leaving CIA.²¹

An important lesson from the Philby case was that gamesmanship between CIA and FBI over possible communist infiltration caused both agencies to not share important information. The consequences were severe. Philby and his associates reportedly provided information leading to the deaths of scores of western agents in the Soviet Union.

Government leaders have long recognized that FBI and CIA have inherent difficulties in sharing information. The main difference between them is that CIA finds and keeps secrets so America can gain strategic advantage over its enemies, while FBI finds secrets so that it can arrest and the Justice Department can prosecute people that break the law. Despite these differences, the two branches of government have to stay out of each other's way and not interfere with one another's cases, where possible.

This cultural divide also afflicted British intelligence agencies. In the words of Philby's biographer, Ben Macintyre,

The conflicting attitudes toward Philby between the sister services of British intelligence would expose a cultural fault line that predated this crisis, long outlasted it and persists today. MI5 and MI6—the Security Service and the Secret Intelligence Service, broadly equivalent to the FBI and CIA—overlapped in many respects but were fundamentally dissimilar in outlook. MI5 tended to recruit former policemen and soldiers... . They enforced the law and defended the realm, caught spies and prosecuted them. MI6 was more public school and Oxbridge... . Its agents and officers frequently broke the laws of other countries in pursuit of secrets, and did so with a certain swagger ... MI5 looked up at MI6 with resentment; MI6 looked down with a small but ill-hidden sneer.²²

Peter Wright, former assistant director of MI5 summarized the role of an intelligence officer this way: "That's our job. If we filter out the things we believe to be true just because we can't prove them, we're failing in our duty."²³

British espionage novelist John le Carre succinctly summarized the universal difference between intelligence and investigative services.²⁴

We are not policemen, we are spies. We do not arrest our targets. We develop them and redirect them at bigger targets. When we identify a

network, we listen to it, we penetrate it and by degrees we control it. Arrests are of negative value. They destroy a precious acquisition. They send you back to the drawing board, looking for another network half as good as the one you've just screwed up.

These differences were not theoretical in the case of NUMEC. The records of the affair are full of references to the difference between intelligence information and court-admissible evidence. In addition, CIA documents recently released show for certain that the Agency withheld important formation from the FBI about the intelligence information it found in Israel.

Cartha "Deke" DeLoach became the CIA's liaison officer to CIA in 1948. In March 1952, he moved up FBI's management chain and in 1963 became FBI liaison to President Lyndon Johnson. DeLoach became deputy director of FBI in 1965, the third highest position in the Bureau. Later in his career, he admitted to using information gained from wire taps on the phones of Dr. Martin Luther King, Jr. and Robert Kennedy but denied being the one that authorized the taps, laying blame for those approvals on an FBI assistant director, William C. Sullivan, FBI's long-time director of intelligence. When DeLoach retired in 1970 Sullivan replaced him.²⁵ Internal FBI distribution lists for investigative information concerning NUMEC often included DeLoach and Sullivan.

When DeLoach stepped down as FBI's liaison officer to CIA in 1952, Sam Papich replaced him. Papich was a former football player at Northwestern University where he earned an engineering degree. He served in the liaison capacity until his acrimonious retirement in 1970 ending a long-festering disagreement with Hoover over the need for FBI to work more closely with CIA. Papich was FBI's liaison to CIA when FBI first became involved in the NUMEC investigations and later when CIA developed its own evidence in the case.²⁶

Papich is credited with cultivating special relationships within CIA and FBI during his stint as FBI's liaison officer, helping senior people overcome the animosity Hoover created. These men included Sullivan of FBI and Angleton of CIA who collaborated on many investigations, including the murders of President Kennedy, Robert Kennedy and Martin Luther King, Jr.²⁷ Papich was on the distribution list for most of the FBI correspondence concerning NUMEC in the period 1965 to 1970.

The names of 18 senior people appeared most frequently on FBI correspondence involving NUMEC from 1965 to 1982.²⁸ The FBI redacted the names of the agents and special agents mentioned in reports of its investigations of NUMEC that were released to the public but not the names of the senior people who were on the distribution lists for its internal and external correspondence. The number of senior people who were informed demonstrates that the Bureau was highly interested in NUMEC throughout its various investigations. The distribution lists for the hundreds of documents in FBI files on NUMEC also show that the Bureau's liaison with CIA was constantly informed from 1965 until at least 1974 and likely beyond, except for the period 1970 to 1973 when there was no formal liaison.

The FBI's liaison with CIA came to be closely linked to James Angleton, CIA's chief of counterintelligence. Angleton forged close ties with William Sullivan, head of FBI's intelligence division, and the FBI liaison officers who walked the halls of CIA Headquarters in Langley, Virginia to promote effective interface between the two agencies. Richard Helms in particular praised Angleton's liaison with FBI.²⁹



James J. Angleton
CIA Counterintelligence Chief
1954-1975

Angleton was born in Idaho, grew up in Italy, graduated from Yale and attended Harvard Law School. He joined the Army in 1943 and OSS soon thereafter. He conducted OSS operations in England and Italy for the duration of the war and joined CIA soon after it was formed. In Italy, just after World War II, when OSS was morphing into CIA, Angleton worked with Allen Dulles to secure the cooperation of former Nazis in the struggle then aborning against the Soviets.³⁰ Angleton was an eccentric, chain-smoking insomniac who dabbled in poetry, gemology, fly-fishing and orchid growing and harbored a healthy case of paranoia, a fitting affliction for a person in his profession.

From his early years in CIA, Angleton managed liaison with British and Israeli intelligence, including cooperation with Mossad, Israel's external security apparatus, and Shin Bet, Israel's internal security apparatus. The close relationship he forged with the Israelis served America well and was one of his enduring legacies. His connection with Mossad became the route through which CIA routinely harvested inside information brought by emigrants from the Soviet Union to Israel.

Angleton's peers in the intelligence community held him in high regard, including Amos Manor who headed Shin Bet from 1953 to 1963. Manor was Angleton's counterpart in some of the most successful joint projects undertaken by Israeli and American intelligence agencies.³¹ Angleton's most celebrated accomplishments included his acquisition of Nikita Khrushchev's 1956 denunciation of Joseph Stalin in a speech to the Twentieth Congress of the communist party of the Soviet Union. Angleton asked his Israeli connections to get a copy of the speech and they delivered. The copy was judged authentic by George Kennan, released to the *New York Times* and beamed over Radio Free Europe into the Soviet Union.³² Such Mossad-assisted intelligence coups enabled

Angleton to reign supreme over CIA's connection with Israel for the rest of his career.

Historian Mark Riebling recounted how Sullivan and Angleton understood that the Soviets preyed on schisms between their agencies. The two of them worked hard to overcome the working level distrust bred by Hoover's enduring animosity to all things CIA. Angleton had a phrase for the problem, "dissociation of sensibility," which he took from "The Metaphysical Poets," a critical essay by T. S. Eliot who used the phrase to describe the thematic dualism in literature, that is the separation of thought and feeling. Angleton called on thematic dualism to describe the tension between Hoover's law-enforcement mentality (if you find a spy, prosecute him) and CIA's double-agent approach (if you find a spy, put her to work for you).³³

In February 1953, within his first month as president, former General Dwight Eisenhower elevated Allen Dulles to the post of DCI and appointed General Smith as undersecretary of state. Dulles was the fifth DCI, the first civilian to occupy that post and the longest serving (1953-1961). Unlike his predecessors, Dulles had intelligence experience before becoming DCI. As a member of OSS during World War II, he secretly negotiated the surrender of German troops in northern Italy. He also served as Berlin station chief of OSS at the end of the war.³⁴

Notable events on Dulles' watch included the overthrow of leaders in Iran and Guatemala and the deployment of U-2 spy planes for secret aerial reconnaissance of America's friends and foes. Dulles and his men lied to President Eisenhower in describing their role in masterminding the 1954 overthrow of President Arbenz in Guatemala, lies that led Richard Bissell, one of CIA's most renowned spies, to identify the coup as a turning point. "Many of us who joined the CIA did not feel bound in the actions we took as staff members to observe all the ethical rules." They were prepared to lie to the president.³⁵

There were notable failures on Dulles' watch. On May Day 1960, the Soviets shot down a U-2 over Russia and captured the pilot, Francis Gary Powers. Although Eisenhower personally authorized U-2 flights over the Soviet Union, he denied doing so until he was caught in the act. As Tim Weiner surmised, "For the first time in the history of the United States, millions of citizens understood that their president could deceive them in the name of national security."³⁶

Dulles' biggest mistake was failing to anticipate Fidel Castro's turn to communism. After the fact and at Eisenhower's direction, Dulles and Richard Bissell developed a plan for a counterrevolutionary movement in Cuba to overthrow Castro. In approving the plan in March 1960, Ike told CIA he knew "of no better plan," and he correctly predicted, "The great problem is leakage and security." Ike cautioned, "Our hand should not show in anything that is done." Although he was correct in discerning the risk, he erred in thinking his actions could be covered up. As he was leaving office, President Eisenhower looked back in anger at the intelligence failures of his presidency. He told Dulles, "The structure of our intelligence organization is faulty ... I have suffered an eight-year defeat on this [and] leave a legacy of ashes."³⁷

John F. Kennedy became president in January 1961. He modified CIA's plans for overthrowing Castro, ultimately approving a last minute scheme developed by Bissell for Cuban exiles to attack the island with only limited U.S. air support. When the April invasion faltered, Kennedy refused to order additional air support, CIA failed to exert effective control of the exile forces and the operation failed. In sixty hours, the Cuban air force killed four Alabama National Guard pilots, while the Cuban army killed 114 Cuban exiles at the Bay of Pigs and captured the remaining 1,189 invaders. The invasion was a rout.³⁸

A few months later, President Kennedy forced Dulles and Bissell, the invasion masterminds, out of the CIA. He named John Alex McCone to replace Dulles as DCI and Richard Helms to replace Bissell as Director of Plans. McCone was a conservative Republican, engineer, successful businessman, former undersecretary of the Air Force, and former chairman of the AEC (1958-1961). He was considered a strong manager, so his appointment signaled Kennedy's intent to exert greater control over the intelligence community.

McCone created a science and technology directorate in CIA and combined the aerial capabilities of CIA and DOD into a more effective national reconnaissance program. Being an outsider, he reportedly never learned of CIA's deepest secrets, such as the illegal opening of U.S. mail and plots to assassinate Fidel Castro.³⁹

Two years after McCone took office, he had to deal with CIA's failure to tell the FBI that CIA officers had observed a visit by Lee Harvey Oswald (or a double), a supposed Cuban sympathizer, to the Soviet and Cuban embassies in Mexico City only weeks before he allegedly killed President Kennedy. A 2013 CIA report written by one of its historians on the occasion of the 50th anniversary of Kennedy's murder described how McCone, who died in 1991, "was complicit in keeping incendiary and diversionary issues off the [Warren] commission's agenda and focusing it on what the Agency believed at the time was the 'best truth'."

Although McCone had some successes (he was the first to predict Soviet intentions to place ballistic missiles with nuclear warheads in Cuba),⁴⁰ he was a misfit in the Johnson Administration. After less than four years on the job, in early 1965, he decided to leave. Johnson did not try to stop him.

Johnson's advisors said that Richard Helms was a logical successor to McCone but needed additional experience as deputy DCI before taking over the top spot. Thus, in April 1965, about the time that a significant amount of highly enriched uranium showed up missing from the NUMEC facility in Apollo, Johnson appointed retired Vice Admiral William F. Raborn, Jr. as DCI. Raborn had managed the Navy's submarine-launched, nuclear-tipped Polaris missile program. Although Raborn enjoyed the trust of the president, he was a bust within CIA because he knew little or nothing about intelligence and foreign affairs.⁴¹

Raborn's ineptitude did not impress senior CIA staffers who soon were near mutiny.

President Johnson fired him on June 30, 1966 and elevated Helms to the position of DCI. Helms proved to be one of the most competent and successful men ever to serve in that role. His tenure of six and a half-years was then second in length only to Allen Dulles. While Helms was DCI, his officers confirmed that Israel had developed nuclear weapons, and they found traces of uniquely enriched uranium in Israel that traced back to NUMEC.

Within a few days of becoming DCI, Helms attempted to improve relations with the FBI by “making his manners” with Hoover. His driver took him from CIA’s headquarters in Langley, across the Potomac River and down Pennsylvania Avenue to the Department of Justice Building that housed the FBI. Helms intended a get-acquainted meeting, but Hoover dominated the conversation with a forty-five minute, non-stop monologue on the history of FBI in peace and war. Helms said he left the meeting with the sense that Hoover was not willing to listen to CIA’s input. The two Directors never held another personal conversation.⁴² Lacking leadership from the top to overcome inherent differences in mission and approach, the relationship between FBI and CIA continued to deteriorate throughout their separate investigations of NUMEC.

Despite their differences and their history of bad relations and missed opportunities, FBI and CIA agree on some things. For example, CIA has no law enforcement function. Rather, it collects and analyzes information to aid the formation of national security policy, and it conducts clandestine operations in foreign countries to implement national security policy. According to the rules, CIA only collects information regarding foreign countries and their citizens. Federal laws prohibit CIA from collecting information regarding “U.S. persons,” a term that includes U.S. citizens, resident aliens, legal immigrants, and U.S. corporations, regardless of where they are.

There has been less agreement on matters arising at the interface between CIA and FBI. For example, when FBI refuses to conduct surveillance of suspected spies in the United States that CIA identifies, CIA occasionally has set up its own domestic surveillance apparatus.

Both CIA and FBI conduct counterintelligence operations. The FBI today says it is responsible for detecting and lawfully countering actions of foreign intelligence services and organizations that employ human and technical means to gather information about the United States that adversely affects national interests. Such espionage activities involve attempts by others to acquire classified, sensitive or proprietary information from the U.S. government or from U.S. companies.

The CIA, on the other hand, is responsible for conducting activities in foreign countries that FBI strives to detect and prevent in the United States, e.g., espionage (unnoticed theft of information) and covert action (clandestine projects, some with observable effects).⁴³ The CIA also strives to detect in places outside the country what the intelligence services of foreign countries intend to do in the United States. Because of the interface between offshore and onshore activities, multiple handoffs occur between CIA and FBI, and functions overlap.

As this account will show, investigations of NUMEC suffered from the inherent conflict between CIA and FBI. The two agencies disagreed about jurisdiction and methods

for dealing with the reputed acts. They failed to share information gained within the United States by the FBI and inside Israel by the CIA. Most importantly, people within these agencies and other branches of government disagreed over whether America should aid, or at least ignore, Israel's acquisition of nuclear and other advanced weapons or enforce laws that prohibit the unauthorized transfer of nuclear materials and information to third parties.

In the NUMEC affair, the FBI functioned in its domestic law enforcement role, while the CIA, arriving later on the scene, performed its role of informing U.S. policy makers of the activities, status and intentions of Israel. The FBI used the information it gained to seek sanctions against NUMEC and its founder, Zalman Shapiro. The CIA used the information it gained overseas to inform National Intelligence Estimates it prepared for the president on the development of nuclear weapons in Israel. Poorly informed by both FBI and CIA, the AEC found itself in a quandary.

Hundreds of FBI documents supply most of the facts about the NUMEC affair described in this book. The Bureau has released several thousand pages of documents derived from its investigations of NUMEC that spanned more than 20 years. It provided these documents in response to a number of FOIA requests. The public versions of those documents contain some references to and documents from the AEC. A few contain references to the CIA. It is likely that such references and information derived from CIA sources abound in the original documents, but FBI redacted nearly all of those references at the request of the CIA. However, the distribution lists on the more significant FBI documents contain the names of FBI's liaison officers to CIA. It is clear the two agencies communicated about NUMEC; however, much of what they said to one another has not yet been made public, except for statements by people who saw the documents before they were redacted.

Several reasons may account for the redaction of CIA information in FBI documents. First, CIA and FBI have religiously guarded their right to protect their sources and methods. Thus, it is common to see fifty-year-old classified files, including some of those in this case, with significant portions redacted before release to the public. Second, CIA and FBI have been at odds with one another ever since Congress created CIA. Their battles over turf, role, reputation and the ear of the president are legendary. Thus, some redactions may cover up disagreements over the NUMEC affair. Third, hindsight reveals that FBI investigations of NUMEC were bizarre at best and grossly ineffective at worst. It is possible that FBI made some redactions to hide its incompetence.

Finally, if someone in the U.S. secretly aided the transfer of nuclear weapons materials and information to Israel, then it could be argued that acknowledgement of that fact by CIA or FBI, even fifty years later, would diminish the moral authority of the United States in its ongoing efforts to prevent other countries in the Middle East from acquiring nuclear weapons and in its self-proclaimed leadership in upholding the Nuclear Nonproliferation Treaty. The fact that U.S. government documents are still withheld from public view, so long after they were generated, creates suspicion that they contain secrets of this sort.

This account benefits from the few CIA documents that have been released. For example, CIA prepared National Intelligence Estimates pertaining to Israel's nuclear weapons program. The Agency later released some of those Estimates in redacted form. In addition, officials that saw the originals have described in open literature the major conclusions of the classified Estimates. The CIA also prepared reports and Intelligence Estimates about the proliferation of nuclear weapons and released those documents in redacted form, including some that involve Israel. This is the first account ever to utilize other CIA documents about NUMEC obtained recently through appeals to the Interagency Security Classification Appeals Panel and through the Federal courts.

A brief recounting of the first few years of the Atomic Energy Commission provides a useful backdrop for the NUMEC story. In August 1945, when two atom bombs ended World War II, few other countries had the knowledge to develop nuclear weapons. Because of their work with the Manhattan Project, both Britain and Canada knew how to make a bomb but had no facilities for producing weapons-grade uranium or plutonium. The Soviet Union stole bomb designs and fabrication methods from Los Alamos Laboratory during the Manhattan Project and was hard at work soon after the war to produce plutonium to replicate the Nagasaki bomb.

After the war, the United States, Canada and Britain asked the United Nations to establish controls for atomic energy. They proposed mechanisms to provide other countries with scientific information on peaceful applications of nuclear technology in exchange for forbearance by those countries in the development of nuclear weapons.

In 1946, Congress passed the Atomic Energy Act to create a Federal government monopoly of nuclear energy and to give control of that monopoly to an independent Atomic Energy Commission or AEC. The primary tenet of the Act was to require civilian control over atomic energy by vesting authority in five civilian commissioners drawn from a cross section of political affiliations. The Act gave first priority to military applications of atomic energy and lower priority to research on civilian uses of atomic energy.

The 1946 Act required the federal government to own all radioactive materials and the facilities to produce them. All commissioners and staff of the AEC were required to have a Q security clearance that provided access to Restricted Data, the classification accorded to information involving design, manufacture or use of nuclear weapons. Most information about the production and utilization of special nuclear material or SNM (plutonium, enriched uranium, and other materials used to make a nuclear weapon) was classified. The organization of the AEC included an executive officer called General Manager who reported to the commissioners and managed the staff of the commission.⁴⁴

In the 1946 Act, Congress also created a Joint Committee on Atomic Energy (JCAE or Joint Committee) to provide oversight of the new AEC. It was one of the few committees ever established by statute rather than rules of the respective houses of Congress. The JCAE had exclusive access to the information upon which its deliberations were based, including classified information not available to other committees of the House or Senate. The isolation and protection of information made the JCAE one of the most powerful Congressional committees in history.⁴⁵

The Joint Committee had nine members from each house, with no more than five from one political party, and an executive director. The 1946 Act required the AEC to keep the Joint Committee “fully and currently informed with respect to the Commission’s activities.” Congress generally accepted what the Joint Committee decided on atomic energy matters from 1946 until 1977. In early 1975, implementation of the Energy Reorganization Act of 1974 divided the duties of the AEC between two new agencies, the NRC and the Energy Research and Development Administration (ERDA). A reorganization of the Senate abolished the Joint Committee on August 5, 1977.

Near the end of 1947, the AEC began to reorganize the complex of laboratories and production facilities of the Manhattan Project. The AEC continued to produce plutonium at the Hanford Engineering Works in Washington State. It continued to enrich uranium at Oak Ridge National Laboratory in Tennessee and later added uranium enrichment facilities in Paducah, Kentucky and Portsmouth, Ohio. Argonne National Laboratory in Illinois became AEC’s center for power reactor development. Los Alamos Scientific Laboratory continued to be the center for development of nuclear weapons. In 1949, AEC created Bettis Atomic Power Laboratory in Pennsylvania to support AEC’s naval nuclear propulsion group.

In 1947, the AEC had 4,700 government employees and 50,000 contractor employees. By 1952, the enterprise grew to 6,700 government and 136,000 contractor employees.⁴⁶ The disparity between government and contractor employees owed to a decision to continue the reliance placed by the Manhattan Project on scientists, engineers and technicians provided by private industry. This approach afforded private companies access to the technical fundamentals of atomic energy that were then still classified. It also led to a system of management of the AEC’s facilities that was highly decentralized.⁴⁷

In 1949, the Soviet Union exploded its first atom bomb. Klaus Fuchs and others at Los Alamos facilitated that achievement by spying for the Soviets, then allies of the United States, on the Manhattan Project during World War II. Their espionage cut years off the lead-time that American officials had estimated for the Soviets’ atom bomb program and soon led to a decision by President Truman to build the more powerful and destructive hydrogen bomb.

When Dwight Eisenhower became president in 1952, the AEC’s empire was continuing to expand. *Time* magazine reported, “The AEC controls a land area half again as big as Delaware—and it is growing more rapidly than any great U.S. business ever did. Its investment in plant and equipment ... makes it bigger than General Motors Corp.”⁴⁸

By December 1953, the United Nations had made little progress in implementing the proposals made by Britain, Canada and the U.S. for controls on the spread of nuclear weapons. Furthermore, the United States was seeking to quell fears of the nuclear age by counterbalancing its shift from conventional to nuclear arms with peaceful uses of atomic energy. To those ends, President Eisenhower delivered his “Atoms for Peace” speech to the General Assembly of the United Nations. His primary objective was to establish and maintain American superiority in atomic energy, an important strategy in the Cold War, while providing countries without nuclear materials a means to benefit from nuclear

power without acquiring nuclear weapons.⁴⁹

Ike proposed that the “governments principally involved” should make joint contributions from their stockpiles of natural uranium and fissionable materials to an international atomic energy agency under the aegis of the United Nations. The agency would be responsible for “impounding, storage and protection” of those materials for distribution to member states for peaceful applications. The new agency also would be responsible for dispersing information supplied by the advanced nations about peaceful applications of atomic energy.⁵⁰

Consistent with Eisenhower’s proposal of Atoms for Peace, Congress passed an amendment of the Atomic Energy Act in 1954 that permitted the exchange of nuclear materials, equipment and information with other countries for peaceful uses of atomic energy under conditions to be specified in formal bilateral agreements with each country. In the next three years, AEC established bilateral agreements with about twenty countries.

Pursuant to the 1954 Act, AEC required that the materials, equipment and information provided under such agreements should be subject to safeguards, including inspections by U.S. personnel, to verify their use for peaceful purposes. The first bilateral Agreement for Cooperation was signed with Turkey on April 28, 1955. On May 25, the commission approved agreements with Colombia, Brazil, Israel, Spain and the Philippines. Eleven more agreements were consummated in early June.⁵¹ Israel’s agreement to cooperate under the Atoms for Peace program belied the secret intentions of some of its leaders to resist international oversight of their nuclear weapons ambitions.

America conducted its first thermonuclear test in 1952, on the island of Enewetak in the South Pacific, and the Soviets, again aided by espionage, followed suit less than a year later.⁵² Competition with the Soviets led the AEC to ramp up its manufacturing of weapons by developing additional production facilities, such as the tritium and plutonium production facilities at the Savannah River Plant in South Carolina, while slowing down the development of commercial nuclear power and the declassification of information needed to stimulate industrial participation.⁵³

On October 1, 1955, AEC issued its first license for a privately owned nuclear reactor, a research reactor at North Carolina State College. In 1956, AEC issued its first construction permits for commercial nuclear power plants, the Indian Point plant near New York City and the Dresden plant near Chicago. That same year, AEC issued its first contract under the Power Reactor Demonstration Project to help Yankee Atomic Electric Company construct a nuclear power plant in Rowe, Massachusetts.

The AEC’s initial emphasis on accountability procedures for SNM reflected the strategic value of fissionable materials in nuclear weapons. The government expended billions of dollars during World War II to produce a few kilograms³ of highly enriched uranium (HEU) and plutonium and did not want to squander its investment. Therefore, the government initially owned and accounted for all of these rare and valuable materials. As the supply and value of SNM changed, the emphasis on accountability changed to reflect

the perception that “business prudence dictates prevention of loss or diversion of dollar-significant quantities... .”⁵⁴

The amendment of the Atomic Energy Act in 1954, which allowed SNM to be held but not owned by private industry, led AEC to strengthen controls over SNM. It tasked its Division of Source and Special Nuclear Materials to review at least annually the effectiveness with which AEC managers monitored SNM distributed to private industry. In 1954, the commission also established a Division of Inspection to gather information on how well contractors and licensees complied with the provisions of the Act.

A management review by the Division of Inspection in 1955 found that the basic system for contractor control of SNM was sound. That system delegated responsibility for control of the materials to their physical location. Nevertheless, in 1956, the commission issued new regulations on controls to be exercised for SNM held by its licensees. They required licensees to maintain measurement and record systems for transfers and inventories and to reimburse the commission for any loss of or damage to SNM, such as dilution of the enrichment of HEU. The regulations did not impose details on the accountability systems since financial responsibility for the material was thought to be adequate to prevent theft, and any licensee guilty of unlawful diversion (nuclear parlance for theft) was subject to criminal sanctions prescribed in the 1954 amendment of the Act.

In 1957, the AEC replaced its Division of Civilian Applications with the Division of Licensing and Regulation. In 1959, the commission appointed an Assistant General Manager for Regulation and Safety with responsibility for inspecting AEC’s licensees holding SNM. By then, commercial facilities had been built and were being licensed to serve all phases of the nuclear fuel cycle, shown in the following table.

Nuclear Fuel Cycle
Mine uranium ore
Mill and leach ore to extract uranium oxide and produce yellowcake
Process yellowcake to produce uranium hexafluoride (UF ₆)
Enrich U-235 content of UF ₆
Process UF ₆ to uranium dioxide (UO ₂) and fabricate fuel elements
Use the fuel elements in a nuclear reactor
Dispose used fuel or reprocess it to remove plutonium and uranium
Make new fuel from reprocessed plutonium and uranium

In 1959, AEC began to require annual surveys to demonstrate that local controls of SNM were effective. These surveys included the first third-party inventories of SNM. The

details about which records and measurements should be used were left to the individual contractors that held SNM at specific locations. Any unresolved inventory differences involving a suspected violation of law were required to be reported to the FBI.

In 1961, the commission established the position of Director of Regulation thereby separating the developmental and the regulatory functions of AEC. In 1962, Stanford Research Institute (SRI) completed a study of the efficacy of regulatory controls of SNM. It concluded, “Neither the current nor the suggested improved system would always reveal significant diversions of source [material] and SNM at any point in the system.” The commission undertook improvements because of the SRI study.

In 1964, the Private Ownership Act allowed sale of SNM to private entities while maintaining the government’s control of SNM for health, safety and security purposes. The Act gave AEC authority to license ownership, import and export of SNM. The AEC issued standard measurement methods for plutonium and uranium in 1964. AEC continued to apply its policy that financial responsibility for the loss or damage of SNM would prevent its diversion. The NUMEC affair soon demonstrated AEC’s naiveté.

¹ The National Security Act of 1947 created NSC as the president’s principal forum for considering national security and foreign policy matters with his senior national security advisors and cabinet officials. Thirty years later, it was closely informed of the NUMEC affair.

² In the intelligence trade, FBI officers are referred to as agents or special agents and spies that FBI controls are called informants. CIA operations personnel are called officers or case officers while agents are spies in CIA parlance.

³ In this book, material weights are stated in kilograms, abbreviated kg. For readers who prefer English units, a kilogram equals 2.2 pounds.

Chapter 2

Israel's Nuclear Genesis

In a radio broadcast on May 15, 1948, David Ben-Gurion announced the creation of the State of Israel. As its first prime minister, he vowed to use science and technology to ensure that the Jewish people would never be as helpless as they were in the Nazi Holocaust. He said science and technology had two roles in the realization of Zionism—to advance the nation of Israel spiritually and materially and to provide defense against its enemies. His vision included atomic energy. He wrote in 1948, “We are living in an age of scientific revolutions, an era that discloses the atom, its miraculous composition and the tremendous power hidden in it.” Ben-Gurion also wrote, “What Einstein, Oppenheimer and Teller, the three of them are Jews, made for the United States could also be done by scientists in Israel for their own people.”⁵⁵

In 1952, after the death of Chaim Weizmann, Israel's first president, Ben-Gurion offered Israeli citizenship and its presidency to Albert Einstein. In declining the offer, Einstein cited old age as a factor (he died three years later) and noted, “my relationship to the Jewish people has become my strongest human bond, ever since I became aware of our precarious situation among the nations of the world.”⁵⁶

The other two virtuoso physicists cited by Ben-Gurion consulted with him on other occasions. In 1952, the prime minister hosted Oppenheimer and Teller for several hours at his home in Tel Aviv. Although this was the first of only two reported meetings between Ben-Gurion and Oppenheimer, it was the start of a 20-year relationship of Teller's with Ben-Gurion and leaders of Israel's nuclear program.⁵⁷

Pulitzer Prize winning investigative reporter Seymour Hersh called Ernst David Bergmann the Israeli Oppenheimer, the scientific father of the Israeli bomb. Born in 1903, the son of a rabbi, Bergmann was a refugee from Nazi Germany and a brilliant organic chemist. He met Chaim Weizmann in London in 1933 and helped him establish the Daniel Sieff Research Institute in Palestine in the 1930s with funding from the Sieff family in Britain. The Institute attracted other scientists fleeing the Nazis. During World War II, Bergmann and Weizmann developed production techniques for synthetic rubber to aid the allied war effort. By 1946, the Sieff Institute had become the Weizmann Institute of Science. In the late 1940s, the Institute established a radioisotope research department. It also sent young scientists abroad to study nuclear energy and nuclear chemistry. It established a relationship with the French Atomic Energy Commission and developed means to make heavy water and to extract uranium from phosphate mined in the Negev desert.⁵⁸

Bergmann attracted Ben-Gurion's attention and became a faithful protege and trusted confidant of the elder statesman. However, Bergmann's relationship with Weizmann reportedly soured when the two clashed over the Institute's role in military research and Weizmann's wife learned of Bergmann's philandering. In July 1951, Bergmann left the Institute to become scientific advisor to the defense minister. In 1952, Ben-Gurion appointed him the first chairman of the Israeli Atomic Energy Commission

(IAEC).⁵⁹ In 1953, Ben-Gurion appointed 30-year-old Shimon Peres as director general of the Ministry of Defense. Bergmann's IAEC reported to Peres. Although Bergmann and Ben-Gurion talked a lot about nuclear power's ability to "make the desert bloom," Hersh said, "Nuclear power was not Ben-Gurion's first priority; the desert would glow before it bloomed."⁶⁰ The triumvirate of Ben-Gurion, Peres and Bergmann drove the Israeli nuclear weapons program.

In July 1955, the United States offered to supply a research reactor to Israel. The offer included a \$350,000 grant to defray expenses of the project, pursuant to Eisenhower's Atoms for Peace program.

A month later, Bergmann wrote a classified report about the First International Conference on Peaceful Uses of Atomic Energy, which the United Nations convened in Geneva, Switzerland. Bergmann's report articulated his vision for the future of the Israeli nuclear program and included his idea of secretly extracting plutonium from the Atoms for Peace reactor. His report also recommended making "all efforts to get as much assistance as possible from the United States, in both information and material; this effort needs to be made as early as possible, for political considerations may influence the American response to our request." Bergmann also recommended accumulating the quantities of thorium and uranium that "will be needed for our future plans."⁶¹

That same month, in an oft-repeated refrain in the annals of nuclear proliferation, Bergmann told the U.S. Ambassador to Israel,

Israel wanted to go forward immediately towards the development of atomic power because of the desperate need for power in Israel due to the impossibility of securing oil from the Middle East. He stated that the Israeli universities had most adequate courses in physics, had made a start in chemistry, were far behind in engineering, and *their system of education in metallurgy was nonexistent*. He stated that Israel was now *producing uranium from phosphates* and was producing heavy water, both in small quantities. They had devised what they thought was an original reactor which utilized a core of enriched materials and a blanket of natural uranium, plus heavy water... . They had discovered that basically their reactor was the same as the U.S. design for the Shippingport reactor... . He recognized this reactor would produce a small amount of plutonium.⁶²

The italicized words in this quotation denote areas that Israel and NUMEC later adopted as areas of mutual interest and cooperation. Also of note is the fact that Zalman Shapiro was involved in significant ways with design and construction of the Shippingport reactor. Bergmann went on to indicate to the Ambassador that he wanted to get an American reaction to this plan.

Bergmann also discussed with AEC Chairman Lewis Strauss the need to train Israel chemists to work with the new elements, including plutonium. Strauss responded, "You could not do anything that would provide you even the slightest quantities of plutonium." Nevertheless, Bergmann persisted with his secret plan to design a reactor that would produce small quantities of plutonium and to hide that fact from the Americans. Amos

deShalit, the head of nuclear physics at the Weizmann Institute, opposed that approach and particularly Bergmann's intent to deceive the Americans. "We should forget about submitting a plan which does not indicate the real purposes... . It is evident the issue cannot be snuck in through talk about fissile products, power plants, etc." Ben-Gurion sided with de Shalit and secretly approached the French for help with his dream of an Israeli nuclear arsenal.⁶³

In April 1956, Bergmann and several others, including Scientific Counselor Victor A. Salkind of the Israeli embassy in Washington, DC, visited the AEC's offices on H Street in downtown Washington, DC to meet with AEC's division of international affairs. The Israelis said they were seeking aid for a nuclear research reactor to be fueled by natural uranium produced in Israel. They also requested research quantities of enriched uranium. They claimed to hold an advanced technological position in the atomic field and a wish to "skip over" experimental reactors. That is, they wanted something bigger than an experimental reactor, something they could put to productive use, not just conduct tests. They also discussed the offer by President Eisenhower to give Israel \$350,000 to support construction of a research reactor.

The Israelis also requested training in reactor operations, control of radiological hazards and metallurgy of reactor components. The U.S. attendees at the first meeting expressed reservations over the metallurgy question because "certain aspects of this field are still classified."⁶⁴ Metallurgy would prove to be key in Israel's relationship with NUMEC.

After this introductory meeting, the Israeli delegation toured the United States and contacted a number of AEC laboratories and private firms engaged in nuclear activities. Before going home, the Israelis returned to AEC headquarters to report the results of their meetings and to request further assistance from the AEC staff. Dr. Bergmann told his AEC hosts that his group had "fruitful" visits to "various Commission installations." He reiterated that Israel was planning to build a natural-uranium, heavy-water-moderated reactor. He said they had given their specifications for such a reactor to a number of American firms and expected to receive bids in a few weeks. He expressed again his interest in obtaining heavy water and U-235 from the U.S. for experimental purposes. During the discussion, the Israelis said they had been in contact with various American firms in connection with fabrication of fuel elements for their reactor. Hal Bengelsdorf of the AEC recorded the minutes of the second meeting.⁶⁵ Bengelsdorf was involved with nonproliferation matters while working for the AEC and after he retired from government service.⁴

The record of that second AEC staff meeting with the Bergmann entourage does not list the people or companies the Israelis contacted. Since Zalman Shapiro was a leading American metallurgist and by then a person of growing influence among American Zionists, perhaps Bergmann met him or even recruited his assistance during that first official visit to the United States.

Shapiro later said he developed a special relationship with Bergmann. He told Hersh that Bergmann “was a genius. He was a genius’s genius. He worked night and day. I don’t know when he slept.”⁶⁶ By 1965, Shapiro and Bergmann were serving together on the Board of Directors of ISORAD, a joint venture company organized by the IAEC and NUMEC for various radiological enterprises in Israel.

If Bergmann recruited Shapiro during the Israeli’s first official visit in 1956, it probably signaled Israel’s return to the approach of the Sonneborn Institute of the late 1940s. The so-called Institute was a secret federation of millionaires that financed arms shipments to Israel at Ben-Gurion’s request for the fledgling Israeli nation. Perhaps the Israelis began in 1956 to apply the approach used in the 1940s to recruit arms assistance from abroad, only this time the objective was to obtain assistance for their nuclear weapons program from experts in the United States.⁵ Officials in the CIA would later come to that point of view and concluded, “Shapiro was a consultant to the Israeli AE program in 1960 or earlier.”⁶⁷

The most important supporter of Shapiro in founding NUMEC was David Lowenthal. Lowenthal was connected with the Sonneborn Institute as part of his service with the ship *Exodus* in the late 1940s.⁶⁸ By 1956, he lived next door to Shapiro in suburban Pittsburgh and would likely have introduced the two men at that time of Bergmann’s first visit in 1956. Lowenthal and Shapiro founded NUMEC in 1957.

Later in 1956, Bergmann formally requested AEC to sell heavy water to Israel. His request went to AEC Chairman Lewis Strauss. He said the heavy water would be used in a 10-megawatt natural uranium reactor.

On December 4, the AEC staff met with Dr. Ephraim Lahav, another scientific counselor of the Embassy of Israel. He inquired about the status of a reply to Bergmann’s letter concerning heavy water. He said that the Israelis had chosen a site for their reactor and asked about getting two Israeli scientists into a training program. He also requested permission to visit Oak Ridge National Laboratory (one of the sites at which AEC enriched uranium) and Argonne National Laboratory (AEC’s lead laboratory for development of reactor technology). The AEC staffers replied that Chairman Strauss and the Israeli Ambassador had resolved the question of heavy water (the U.S. would not supply it) and that they would be glad to look into the training matter and to arrange the visits that Dr. Lahav requested.⁶⁹

In 1957, Israel accepted the 1955 offer by the United States to supply a specific research reactor under the Atoms for Peace program. Construction soon began at Nahal Soreq, a few kilometers south of Tel Aviv where the Soreq River meets the Mediterranean Sea. The reactor was a five-megawatt-thermal, pool-type reactor. Its fuel was enriched uranium (about six kilograms of U-235 per core), and light water served as its moderator and coolant.⁷⁰ A U.S. company, American Machine and Foundry (AMF), constructed the reactor. AMF was a nuclear weapons contractor for the U.S. AEC and constructed the first nuclear reactors in Pakistan, Iran and a dozen other countries.

Ironically, AMF also was in the food irradiation business with the U.S. Army, a business that NUMEC claimed to covet in Israel.⁷¹ The joint venture company ISORAD, which was the creation of Shapiro and Bergmann, included food irradiation among its commercial offerings. Notably, nowhere in the records of Bergmann's early meetings with U.S. AEC officials was there any mention of food irradiation.

Operations at the Nahal Soreq reactor began in June 1960. Scientists from the Weizmann Institute have conducted industrial, medical and scientific experiments in the reactor since then. Under terms of the supply contract, the U.S. had inspection rights to ensure that Israel did not divert nuclear materials from Nahal Soreq to weapons uses.⁷² In April 1965, Israel agreed to let the U.S. transfer responsibility for inspections at Nahal Soreq to the International Atomic Energy Agency (IAEA) in return for the U.S. supplying another 40 kilograms of "enriched uranium, under safeguards, for Nahal Soreq's research program."⁷³ The IAEA has inspected the safeguarding of the nuclear fuel in the Nahal Soreq reactor since that time.⁷⁴ The Nuclear Threat Initiative reports that from 1960 to 1966, the U.S. supplied a total of 50 kilograms of enriched uranium as fuel for the reactor.⁷⁵ There have been no reports of releases of radioactivity from Nahal Soreq.

The Nahal Soreq research reactor was too small to satisfy Israel's quest for sizeable quantities of plutonium. Therefore, Prime Minister Ben-Gurion, Minister of Defense Peres and IAEC Chairman Bergmann undertook discussions with French atomic energy officials to make the same request they had made of the Americans. They asked for assistance in obtaining a heavy-water-moderated, natural-uranium fueled reactor. At the same time, the Israelis began discussions with Norway to acquire heavy water.

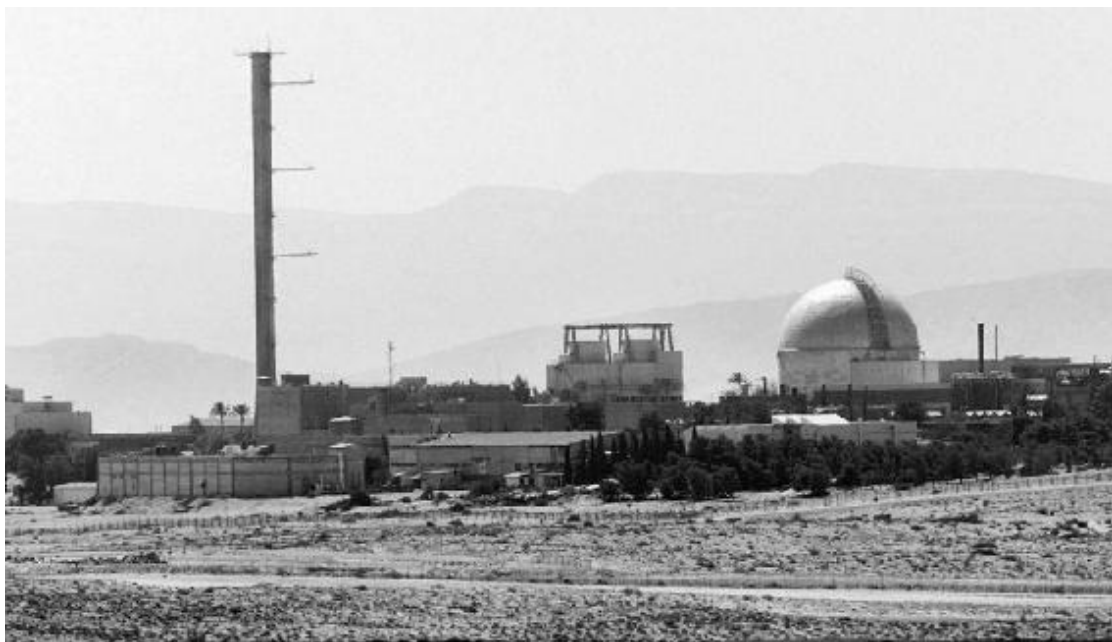
France and Israel had cooperated in a conventional arms deal (jets, tanks, artillery) after a 1955 Soviet-sanctioned arms deal between Czechoslovakia and Egypt. Egypt had been supporting anti-French forces in Algeria, so France sought to strengthen Israel's military to counterbalance Egyptian strength in the region. In addition, the Israelis provided intelligence to France on the Algerian rebels. Then, in return for Israel's assistance in resolving the 1956 Suez Canal Crisis, the French agreed to supply the reactor sought by the Israelis.

In his *Battling for Peace: A Memoir*, Peres said he reached an agreement with the key French officials for them to supply a reactor at a secret meeting in France where Israel, Britain and France adopted a mutual assistance strategy for rolling back the Egyptian occupation of the Suez Canal. Professor and historian Avner Cohen said the French officials apparently did not inform French President Charles de Gaulle about the nuclear aspects of the agreement even though they knew that the reactor would be used in a nuclear weapons program.⁷⁶ The deal solidified when the United States threatened to intervene in the Suez Canal Crisis, which forced British, Israeli and French forces to pull out of the confrontation. The American interference apparently was the last straw for France, which accelerated its nuclear weapons program soon thereafter.

Within a year, in late 1957, the French kept their end of the nuclear bargain with

Israel by formalizing arrangements to begin construction of a reactor and plutonium processing plant in the Negev desert near a settlement known as Dimona. In early 1959, American U-2 spy planes photographed excavations at the Dimona site. One of CIA's top interpreters of aerial photos, Dino Brugioni, realized the Dimona excavations and site arrangements were similar to nuclear facilities at Marcoule, France that had been built a few years before. When CIA briefers informed President Eisenhower of this discovery, "he showed no interest and asked no questions." When further U-2 flights and more photographs showed construction of the Dimona reactor proceeding as the CIA predicted, the White House continued to ignore the project. Brugioni recalled that the Eisenhower Administration was sympathetic to Israel's plight, being surrounded by Arab nations bent on its destruction. He recalled the prevailing attitude: "Whenever you get something on the Israelis and you move it along, you'd better be careful, especially if you've got a career."⁷⁷ Avner Cohen recently published an update of his thinking on who first discovered the existence of Dimona. He apparently agrees that Brugioni was the first.⁷⁸

The Dimona reactor design derived from the French EL-3 reactor, which employed slightly enriched uranium fuel and heavy water for cooling and neutron moderation. The Dimona site had a co-located plutonium extraction facility similar in layout to the French plutonium production facilities at Marcoule. Various reports put the initial thermal power rating of the Dimona reactor at either 24 or 40 megawatts. The plutonium production rate for a 40-megawatt Dimona reactor was said to be 10 to 15 kilograms per year.⁷⁹ Others say that by the late 1970s the Dimona reactor had a thermal power rating of 70 megawatts and could produce 40 kilograms of plutonium a year.⁸⁰ Israeli superspy Arnon Milchan told his biographers, and the Israeli whistleblower Mordechai Vanunu told the press that the reactor later had a 150-megawatt thermal power level, which would provide with an even higher plutonium production rate.⁸¹



Dimona

In 1958 Charles de Gaulle returned to power and learned of French involvement in the Dimona project. He soon required French workers to be withdrawn from the site. Minister of Atomic Energy Jacques Soustelle was a strong supporter of Israel and curbed

de Gaulle's orders.⁸² Andre Finkelstein, former director general of the French AEC, told Cohen a somewhat different story.⁸³

When de Gaulle came back to power he wasn't so much against Israel but he wanted to make peace in Algeria so he had to make something to appease the Arabs and he said we have to stop that project [Dimona] immediately. The orders came from Paris, you have to get rid of all the personnel in your company... . The same day the Israelis started another company and took back all the same people to finish the project. Even under de Gaulle it could be done!"

The possibility that France might abandon the Dimona deal, or that Dimona's plutonium production might be delayed, surely incentivized Israel to consider alternative sources of fuel for the reactor and alternative, near-term sources of fuel for its ultimate goal, the bomb.

In 1958, two Israelis conducted separate visits to British nuclear installations. They were the director of the Dimona project and the head of the research and development authority in the Ministry of Defense. A military attache in the Israeli Embassy in London, Yuval Ne'eman, arranged the visits. Ne'eman was studying in London for his doctorate in physics. A brief memo in the British Foreign Office asked "Why is Israel interested in nuclear power?"⁸⁴

In April 1959, an unidentified source leaked to the British Embassy in Tel Aviv part of a speech by Defense Minister Shimon Peres at the Weizmann Institute three months earlier. Peres alleged that Amos de Shalit's research at the Institute was "a surfeit of theory" at a time when Israel was "developing secret weaponry." Intrigued by this turn of phrase, British Ambassador Patrick Hancock arranged a dinner with Meyer Weisgal, president of the Institute. Weisgal "let his tongue run loose" and told the ambassador about the debate raging within Israel over the development of the bomb. Hancock passed this information along to the American naval attache in Israel who cabled it to Washington in May. The CIA asked the American military attache in Tel Aviv to substantiate the report independently. When he failed to do so, CIA labeled the information as dubious.⁸⁵

In 1959, Norway agreed to supply Israel with heavy water that Norway owned and had stored in the United Kingdom. Israel needed the heavy water to cool and moderate the reactor at Dimona. At that time, U.S. AEC officials were informed of the deal, but they were also told that the final design of a heavy water reactor was uncertain.⁸⁶

On February 13, 1960, in the Sahara Desert in Algeria, France tested its first nuclear weapon. It was a plutonium implosion device and had a yield of about 70 kilotons of TNT, making it the largest ever first-test atom bomb (America's first test of an atom bomb at Trinity had a yield of about 20 kilotons). Before the test, Israeli scientists and engineers looked over the shoulders of their French counterparts in reactor operations, plutonium

production and weapons design. Authors Reed and Stillman, whose book chronicled the political history of the bomb and its proliferation, apparently drawing on the words of French investigative journalist Pierre Péan, quipped that two nations went nuclear with that one test.⁸⁷ Israeli journalist and author Michael Karpin said Israel based the design of its first atom bomb on the French design tested in Algeria.⁸⁸

In August 1960, an American woman serving as a secretary in the U.S. embassy in Tel Aviv accompanied her Israeli boyfriend on an automobile tour of the Negev. They drove by the Dimona facility. The boyfriend told her the French were building a nuclear reactor and introduced her to some Frenchmen that were working at the site. She told her boss at the embassy. He cabled the information to Washington. Once again, CIA attached no importance to the report.

In September, Bergmann met in Vienna with Lawrence B. Hall, assistant general manager for international affairs of the U.S. AEC. Hall was a commissioned officer in the U.S. Public Health Service. Bergmann told him that Israel was building a reactor and was eager to accumulate stocks of uranium to fuel a reactor and extract plutonium. Hall took two months to report the conversation to the head of AEC's intelligence organization.

In late 1960, agencies of the U.S. government finally received undeniable evidence that the French were building a reactor in Israel. A nuclear physicist from the University of Michigan, Dr. Henry Gromberg, described the project to officials of the CIA and the State Department during a debriefing upon his return from a consulting assignment in Israel.⁸⁹ Such debriefings of U.S. scientists after their travels to foreign countries have been a long-standing practice of the CIA and the State Department. Richard Helms noted that these activities were conducted by the Contacts Branch of CIA's Intelligence Division and were primarily overt debriefings of business people and others who travel to areas of strategic interest. He also said that this is a practice followed by most of the world's intelligence services and foreign policy establishments.⁹⁰ Federal employees and contractors that traveled internationally for AEC and NRC were accustomed to friendly debriefs by the CIA. Shapiro may have had similar debriefings after his foreign jaunts because of his Q security clearance.

After hearing from Gromberg, the U.S. intelligence community undertook searching self-examination to discover why it failed to heed earlier indications of the French and Israeli collaboration. The U.S. Intelligence Board (created in 1957 by Eisenhower as the forum for intelligence chiefs to provide advice to the president on intelligence activities) ordered the Joint Atomic Energy Intelligence Committee (an interagency body formed in 1948 and chaired by CIA to coordinate monitoring of foreign nuclear weapons programs) to conduct the self-assessment. The committee's January 1961 report criticized most elements of the atomic energy intelligence community (i.e., AEC, CIA, FBI, Defense, and State). The report identified poor communications within that community as the reason officials had not realized earlier the importance of the Israeli program. The report detailed how Israel had purchased a reactor and natural uranium from France in 1957, acquired 20 metric tons of heavy water from Norway and begun construction of a reactor in the Negev desert in 1959, near Dimona. It also listed the foregoing examples and others of when the

United States should have known earlier about Israel's intentions.⁹¹ There was no mention in the report of Brugioni's discovery of Dimona, based on U-2 photography of excavations at the site in early 1959, or Eisenhower's lack of interest in that discovery.

In order to protect the secrecy of his decision to build nuclear weapons, Ben-Gurion decided that Dimona should be financed with a combination of internal, off-budget defense funds and private funds raised outside the country. The private effort included direct appeals by Ben-Gurion and Peres to wealthy friends of Israel around the world. Ben-Gurion noted in his diary in 1958 that the cost of Dimona would be \$25 million. Peres wrote in his memoirs that Dimona cost \$80 million. In December 1960, President Eisenhower received estimates ranging from \$100 to \$200 million in 1960 dollars.⁹² A month later, the State Department told James Ramey, Executive Director of the Joint Committee, that Dimona had entirely peaceful purposes, Israel would return any plutonium that it produced to France, and the overall facility was expected to cost \$34 Million of which \$17.8 million would be "foreign exchange." State went on to say it would "take any feasible measures to damp down speculation on this matter and in particular to avoid giving occasion for renewed suspicions and possible undesirable reactions in the Arab world."⁹³ John Hadden, CIA station chief in Tel Aviv from 1963 to 1967, estimated that the bomb cost Israel \$100 million and its Jericho missile delivery system cost another \$100 million.⁹⁴ These amounts were about 10 percent of Israel's gross domestic product in the early 1960s.

Ironically, a number of prominent Americans learned of Dimona and its mission before the U.S. intelligence community because wealthy Zionists and Jewish charities helped to pay for the project. Abraham "Abe" Feinberg led the fund raising. He was a New York philanthropist, wealthy businessman, talented lobbyist and major Democratic Party fundraiser. He started out in the garment industry, later becoming chairman of apparel manufacturer Kayser-Roth Corporation and then chairman of American Bank and Trust Company. He invested in businesses based in the United States and Israel and was involved in the construction of buildings in Manhattan and Israel. At the time of his death in 1998, he was chief executive of Central Bottling Corporation, a Coca-Cola-bottling business in Israel. His fund-raising drives for the Democratic Party included President Truman's election campaign in 1948. He was with Chaim Weizmann in the Plaza Hotel in New York on November 29, 1947 when the United Nations General Assembly voted to partition Palestine to provide a Jewish homeland.⁹⁵

Some twenty-five millionaires were said to have contributed around \$40 million for Dimona. Former Treasury Secretary Henry Morgenthau, Jr. assisted Feinberg by coordinating donors from the Sonneborn Institute. Feinberg was the youngest contributor. Other donors included Samuel Zacks, head of the Canadian Zionist Organization, Louis Bloomfield, Canadian member of OSS during World War II and later legal counsel to another Dimona contributor, Samuel Bronfman, founder of Seagram Whiskey. Europeans that were said to have contributed included Baron Edmund de Rothschild of the English banking family, Baron Isaac Wolfson, founder of a successful mail order business in Britain, and Baron Marcus Sieff, son of Israel Sieff who founded the Sieff Institute, chair of a large British retailer and later chancellor of the Weizmann Institute.⁹⁶ A French

citizen, Gustave Leven, was another Dimona donor. His fortune came from the mineral-water company Perrier, which he founded.⁹⁷ It took a while, but President Eisenhower eventually learned that these wealthy members of the international Jewish community were providing large sums of money to finance Dimona's construction. The U.S.-based Israeli journalist Meir Doron and American consultant Joseph Gelman, in their biography of Arnon Milchan said 18 of the 25 wealthy individuals that contributed to Dimona were Americans.⁹⁸

The communications blunders blamed by the intelligence community for America's late recognition of the fledgling Israeli nuclear weapons program may not have been accidental. James Angleton may have purposely withheld information gained by CIA about the startup of the Israeli nuclear program to avoid antagonizing his connections in Mossad. His primary interest was in using Israel to further his knowledge of the Soviet Union, not in preventing Israel from acquiring nuclear weapons. He was a spy, not an enforcer of nonproliferation policies.

Hersh offered a different explanation for the U.S. government's intelligence blunder. He opined that CIA's institutional memory about Dimona's origins was lost to the Agency when Dino Brugioni moved on to new assignments in the mid 1960s and Carl E. Duckett, an expert on Soviet missile systems, came between the raw data on Dimona and the data interpreters at Livermore and Los Alamos.⁹⁹ Duckett, who later played an important part in interpreting intelligence information about the Israeli weapons program and participated in the unveiling of intelligence information about NUMEC, joined CIA in 1963, four years after Brugioni told President Eisenhower about Dimona. Duckett became CIA's Deputy Director and head of its Science and Technology Directorate in 1966.

Whether it was poor communications by or within CIA in the late 1950s when construction of Dimona was getting underway or Eisenhower's reluctance to hear what CIA was telling him because of the importance of the Jewish vote in presidential elections, by 1960 the AEC, the CIA, and the White House knew what was happening. Then, in December 1960, in the waning days of the Eisenhower administration, AEC Chairman John McCone made the news public. On December 13, 1960, *Time* magazine broke the story without naming Israel as the location, saying only "A small power which is neither Communist nor a member of NATO is developing a nuclear option." On December 16, the London *Daily Express* reported that Israel was building an experimental bomb. On December 18, McCone discussed the Israeli reactor on the CBS program "Meet the Press." A day later the *New York Times* carried a detailed account of what AEC knew at the time, and a response by Bergmann that the report was "flattering but untrue." McCone said he decided to go public about the Dimona reactor because he had grown weary of "constant Israeli lying."¹⁰⁰

On December 19, President Eisenhower summoned McCone, along with the secretaries of state, defense, and treasury and others to the White House to discuss the breaking news that Israel was constructing a plutonium-producing reactor. Secretary of State Christian Herter said it was clear the Israelis "have constructed the plant through diversions from private and public aid to Israel." The president was frustrated by Israeli

claims that the reactor was for peaceful purposes, “we do not conceal our plants are for weapons material production, nor do we make any claim that such production is peaceful.” As the meeting broke up, the president admonished the attendees that “no one else [except the secretary of state] is to make any statement that has not been cleared through the State Department.”¹⁰¹

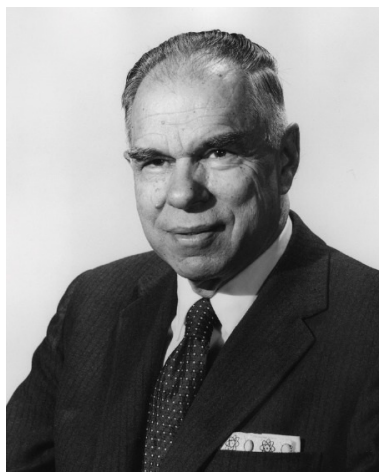
On Christmas day 1960, the *New York Times* published an article by William L. Laurence that discussed concern in Washington for the possibility that Israel was making a run at joining the nuclear club. Laurence was a Lithuanian-born journalist who won two Pulitzer Prizes for his coverage of the Manhattan Project.⁶ He was an eyewitness to detonations of the Trinity and Nagasaki bombs. In his December 1960 article, Laurence downplayed the statement by McCone on “Meet the Press.” McCone had said, “all nuclear reactors do breed plutonium and plutonium is a weapon material.” Laurence called McCone’s statement a “half truth” and went on to opine that the amount of plutonium produced in a 24,000 kilowatt reactor “is very small indeed.” Laurence faulted McCone for not mentioning that refining the plutonium from such a reactor required a chemical plant at a cost of millions of dollars, which was “at present beyond the capacity of any small nation such as Israel... .” Laurence quoted statements by Premier Ben-Gurion to the Israeli Knesset that the reactor would “serve the needs of industry, agriculture, health and science.” Laurence also reported the Israeli government had officially denied that it was developing the capacity to produce nuclear weapons.¹⁰²

President Kennedy took office in January 1961 with nuclear nonproliferation at the center of his foreign policy. He took a more personal interest in proliferation and a tougher stance against it than his predecessor, Dwight Eisenhower, or his successor, Lyndon Johnson. Consistent with the urgency he attached to these matters, Kennedy soon nominated his own choice, Dr. Glenn Theodore Seaborg, to chair the AEC. The Senate approved Seaborg’s nomination on March 1, and he soon moved into his third floor suite in the A wing of AEC’s headquarters in Germantown, Maryland.

Those were the dark days of the Cold War: The Soviet Union and the U.S. were cranking out hundreds of thermonuclear weapons per year while Americans dug bomb shelters and ran practice drills to prepare for a possible nuclear war. The sprawling complex of interconnected three-story rectangular office buildings that constituted AEC headquarters was situated in Maryland farm country north of Washington, DC, well clear of the blast zone of a one megaton nuclear weapon targeted on the White House. The basement of the AEC complex was a hardened bomb shelter.

Seaborg was fated to be chairman of the AEC. He was born in Michigan’s Upper Peninsula in 1912, the son of a second generation Swedish American, Herman Theodore Seaborg, and Selma Erickson, a recent Swedish immigrant. He said his family moved to southern California in 1922 in search of opportunity, but they found only depression-era poverty. He was valedictorian of his high school class in the Watts area of Los Angeles. He worked his way through UCLA as a stevedore, fruit-packer and laboratory assistant, while gaining Phi Beta Kappa honors. He went to Berkeley for graduate school where he earned a Ph.D. in chemistry. He said he “loved physics foremost, but studied chemistry

because chemists could find jobs.”



Glenn T. Seaborg
AEC Chairman
1961-1971

Seaborg became an instructor at Berkeley in 1939, assistant professor in 1941 and full professor in 1945. In 1940, he and Edwin M. McMillan were the first to identify and produce minute amounts of the man-made element plutonium. During his chemistry career, Seaborg was co-discoverer of ten other transuranic elements, including the element that bears his name, Seaborgium. In addition, he and his colleagues identified more than 100 isotopes of elements in the Periodic Table. In 1951, Seaborg and McMillan were awarded the Nobel Prize for chemistry for the discovery of plutonium.

During World War II Seaborg headed the plutonium work of the Manhattan Project at the University of Chicago Metallurgical Laboratory. In four years, the project extracted enough plutonium from reactors it commissioned at the Hanford site in Washington to fuel the atom bombs detonated at Trinity and Nagasaki. In June 1945, Seaborg joined a committee of Manhattan Project participants to develop a plan known as the Frank Report. They recommended that Secretary of War Stinson demonstrate the a-bomb at a remote site to convince Japanese leaders to surrender before the U.S. bombed their cities.

After the war, Seaborg directed nuclear chemical research at Lawrence Radiation Laboratory (LRL). From 1946 to 1950, he was a charter member of AEC's General Advisory Committee. From 1954 to 1961, he was Associate Director of LRL. In 1958, he became Chancellor of the University of California at Berkeley. In 1972, after completing an unparalleled ten-year tenure as chairman of the AEC, Seaborg assumed the presidency of the 138,000-member American Association for the Advancement of Science, and, in 1976, he became president of the 150,000-member American Chemical Society. He authored more than 50 books and 500 journal articles. He was an advocate of increased federal funding of basic research and improvements in education. Historian J. Samuel Walker said that Seaborg was calm, deliberate and thoughtful, a conciliator “who sought to find solutions acceptable to opposing sides on an issue; he had a rare ability to mediate controversial questions without losing his composure or making enemies.”¹⁰³ Others doubted his ability to control the AEC's bureaucrats.

Seaborg said “Kennedy was a steely cold warrior, but after the Cuban Missile Crisis led him to the brink of nuclear holocaust he displayed a commitment that has not received

the attention it deserves. He was more passionately devoted to arms control than any president I have known.”¹⁰⁴ Seaborg also described nuclear proliferation as Kennedy’s “private nightmare.” Kennedy supported the Nuclear Test Ban Treaty that the U.S., the Soviet Union and Britain ratified in 1963 to prohibit nuclear testing in the atmosphere, outer space and under water. Kennedy considered Israel to be the prime example of where binding agreements were needed to prevent the spread of nuclear weapons. Kennedy attached a sense of urgency to this goal because President Eisenhower told him privately on the day before his inauguration that Dimona would be producing weapons-grade plutonium by 1963.¹⁰⁵

Kennedy named his former legislative aide in the Senate, Myer Feldman, a lawyer from Philadelphia, to take the lead on policy issues in the Middle East. Feldman had helped Ted Sorensen plan Kennedy’s presidential campaign. Feldman assisted Kennedy’s preparations for news conferences, was a principal adviser on domestic policy and channeled business requests to the attention of the president, such as tariffs and air routes.¹⁰⁶

Feldman made secret trips to Israel on behalf of President Kennedy, including one with Abe Feinberg in March 1961 concerning Dimona.¹⁰⁷ Feinberg was by then serving as a senior advisor on Israeli affairs for his third consecutive U.S. president.¹⁰⁸ The irony of the 1961 trip was palpable: Feinberg went to convince Ben-Gurion, at Kennedy’s request, to allow Americans to inspect Dimona to ensure its peaceful nature while he had personally and secretly organized international funding of Dimona, at Ben-Gurion’s request, to advance Israel’s clandestine quest for the bomb. When the role of Feinberg and other Americans in financing Dimona came to the attention of President Eisenhower just four months earlier, Treasury Secretary Robert B. Anderson worried that Jewish charities “have been sending money out without control over the purposes for which it is intended. For this reason there is a real question as to whether these contributions qualify as tax-deductible.”¹⁰⁹ Feinberg accepted and implemented a presidential commission to deter a cause that he secretly and unlawfully financed and claimed as a tax deduction. Said differently, American taxpayers helped to finance Israel’s nuclear weapons without their consent or that of their government.

Even though Kennedy garnered about 80 percent of the Jewish vote in his election to the presidency, he argued strongly against Israel’s development of nuclear weapons. He insisted that American scientists be allowed to inspect Dimona to ensure that it was being developed for peaceful purposes. Finally, in exchange for a personal meeting with Kennedy, as negotiated by Feldman and Feinberg, Ben-Gurion allowed the first American visit to Dimona. The AEC selected the two scientists to visit Dimona and other Israeli nuclear facilities from May 17 to 20, 1961. They were Ulysses Staebler, assistant director of the AEC Reactor Development Division, and Jesse Croach, a heavy water expert employed by DuPont at AEC’s Savannah River Plant.

The two scientists reported to Kennedy’s National Security Advisor that nothing was hidden in their tour, and the reactor “is of the scope and peaceful character previously described to the United States.” They also noted that the 26-MW reactor was intended to

be operational by 1964, and its primary purpose was to prepare technicians to operate power reactors that the Israelis intend to build in the future.¹¹⁰

Reed and Stillman reported that two other American scientists visited Dimona in April 1961.¹¹¹ They were both Nobel laureates and veterans of the Manhattan Project, Eugene Wigner and Isidor Isaac Rabi. Wigner was teaching in Israel in 1961 and told the U.S. government in December that he was driven by the Dimona site that summer and told it was a power reactor. Rabi was on the board of governors of the Weizmann Institute of Science.

Two other American scientists reportedly made an impromptu, 45-minute visit to Dimona on September 26, 1962, escorted by Yuval Ne'eman, then research director at the Soreq Nuclear Research Center. It was a hasty affair conducted with no advance warning to the U.S., apparently intended to ease political pressure being brought by President Kennedy.¹¹²

When Kennedy met with Ben-Gurion in New York on May 30, 1961, they talked about Dimona. Minutes of the meeting reflect that Kennedy “was glad the two Americans had had the opportunity to visit the reactor and had given him a good report of it.” The President also expressed the idea that some nations are disturbed by the construction in Israel of a large reactor with plutonium producing capability. He suggested “on the theory that a woman should not only be virtuous but also have the appearance of virtue,” the problem is how to disseminate information about the nature of the reactor so as to remove any doubts other nations might have about Israel’s peaceful purposes.

Ben-Gurion replied that the main purpose of the reactor was to produce cheap energy because Israel suffered from a lack of water and it needed large amounts of electricity to desalinate seawater. He went on to offer “in another three or four years’ time, we will have an experimental plant for separation (of plutonium), which is in any event necessary for every nuclear power plant reactor.”⁷ He gave broad hints that Israel was reserving the option of building a bomb. Kennedy replied, “It is to our common interest that no country believes that Israel is contributing to the proliferation of atomic weapons.”¹¹³ Even though Ben-Gurion lied about using electricity from Dimona (there wasn’t any), it appears that Kennedy was satisfied as long as Israel proceeded with plutonium production in secrecy.

Ben-Gurion later told his biographer that Kennedy “looked like a boy of 25... . I thought he was a leader, a statesman, and I saw that he was a politician.” Forty years later, Shimon Peres told Israeli journalist Michael Karpin that at the time of the Kennedy meeting with Ben-Gurion Israel already had the nuclear option and that the whole struggle that Kennedy maintained was meaningless.¹¹⁴ That claim probably was an invention: Dimona was not producing plutonium by 1961, and Israel had no highly enriched uranium by then, except for the fuel in Nahal Soreq, which was safeguarded by U.S. inspectors.

In December 1962, Kennedy met with Israeli Foreign Minister Golda Meir in Palm Beach, Florida. Kennedy first articulated the special relationship that America sought with Israel. He also raised “our problems on this atomic reactor. We are opposed to nuclear

proliferation.” Meir reassured the president “there would not be any difficulty between us on the Israeli nuclear reactor.”¹¹⁵

On March 26, 1963, McGeorge Bundy, Kennedy’s National Security Advisor, wrote a National Security Memorandum to the Secretary of State, the chairman of the AEC and the DCI concerning “Middle Eastern Nuclear Capabilities.”¹¹⁶ He said that Kennedy decided to track Israel’s development of nuclear weapons closely.

The President desires, as a matter of urgency, that we undertake every feasible measure to improve our intelligence on the Israeli nuclear program as well as other Israeli and UAR [United Arab Republic] advanced weapons programs, and to arrive at a firmer evaluation of their import. In this connection he wishes the next informal inspection of the Israeli reactor complex to be undertaken promptly and to be as thorough as possible... . The President also wishes the Department of State to develop proposals for forestalling such programs... .

By then, Kennedy and his advisors knew the Israelis were lying about the central purpose of Dimona, but they stopped short of doing anything about it. Instead, Kennedy decided to track developments and stall the Israelis where possible. His concern with Israel’s development of nuclear weapons ended with his assassination in November 1963.

The French transferred operations of Dimona to the Israelis in 1963 or 1964, after the reactor had gone critical and operated in the startup phase. Excavation for the co-located reprocessing plant for extracting plutonium from the reactor’s blanket material began in 1963, construction ended in about 1965 and the first production of separated plutonium occurred in 1966.¹¹⁷

In mid 1964, President Johnson began to negotiate directly with Israeli Prime Minister Levi Eshkol as part of a broad initiative to exert American control in the Middle East. The negotiations lasted four years. In January 1968, Johnson invited Eshkol to his Texas ranch. Records of their discussions reflect that Johnson empathized with Eshkol’s description of the dangers to Israel posed by Egypt and made several unconditional commitments to Israel’s security. Subsequently, the State Department and CIA formulated a deal for military aid to Israel. They tried to make up for the president’s failure to provide conditions on the aid by saying the U.S. would provide tanks, warplanes and missiles in exchange for Israel’s renunciation of nuclear weapons. In the end, Johnson proved to be less determined than Kennedy in his opposition to Israeli nuclear weapons—he approved the tanks, planes and missiles without requiring nuclear concessions and halted almost all American aid to Egypt.¹¹⁸



President Lyndon Johnson
Prime Minister Levi Eshkol

Perhaps Johnson considered it a foregone conclusion that Israel would eventually get the bomb, and he was unwilling to fight the inevitable. Another possibility is that Johnson had to deal with the fact that the Soviets were supplying a small research reactor to the Egyptians.¹¹⁹ That is, the United States could counter the Soviets by not impeding Israel's nuclear program.

There were also more personal explanations: Perhaps Johnson's policies stemmed from his association with the Zionists among his close advisors, including Myer Feldman, Abe Fortas, Abe Feinberg and Arthur and Mathilde Krim. Or his policies may have owed to his religious leanings. Karpin wrote that Johnson was a member of the Disciples of Christ and condoned Israel's nuclear endeavors out of an appreciation for the covenant between God and Israel. Perhaps he followed his grandfather's charge to, "Take care of the Jews, God's chosen people. Consider them your friends and help them any way you can."¹²⁰ For whatever reasons, Johnson apparently felt an obligation to bolster Israel's security and conceived of Israel as a frontier land like his home state of Texas.¹²¹

Whether the reasons were psychological, personal or political, President Johnson approved several conventional arms deals with Israel without requiring proof that Dimona had peaceful purposes or that Israel sign the NPT.

When John McCone stepped down from his DCI post in early 1965, he told a colleague, "When I cannot get the president to read my reports, then it's time to go." Hersch opined that McCone knew what Israel's refusal to permit full-fledged international inspection of Dimona meant, but Johnson "didn't understand the implications" of the inspection issue and didn't want to hear about it. McCone believed, said Hersch, that Johnson had three concerns: "His standing in the polls. Can I sell it to Congress? How can I get out of Viet Nam?"¹²² Perhaps Hersch and McCone were wrong. Perhaps Johnson knew more about the Israeli nuclear program than he was letting on. Politicians often hold firmly to contradictory views at one time, thereby maintaining their wiggle room. Thus, Johnson may have been genuinely concerned about the NPT but unwilling to press the Israelis to sign it.

⁴ After leaving government service, Bengelsdorf joined International Energy Associates Limited, a private consultancy in Washington, DC, where he and I worked together from 1984 to 1987.

⁵ As described in his obituary in the *New York Times* on June 4, 1986, Rudolf Sonneborn, a New York industrialist, a longtime leader of the American Zionist movement and one of the most prominent fund-raisers for the young state of Israel in the 1940's and 1950's, founded the secretive, nationwide Sonneborn Institute to send supplies to the Haganah. Sonneborn also was a leading figure in the Zionist Organization of America.

⁶ Gavin Hadden wrote the official history of the Manhattan Project. He was the father of John L. Hadden, CIA's station chief in Tel Aviv from 1963 to 1967.

⁷ The U.S. and some other countries use uranium-fueled nuclear power plants and do not recycle plutonium from used fuel. According to the World Nuclear Association, five countries now use recycled plutonium in nuclear power plants, namely, UK, France, India, Japan and Russia.

Chapter 3

The Apollo Uranium Plant (1957-1965)

Apollo, Pennsylvania is located in the Kiskiminetas River Valley about 30 miles northeast of Pittsburgh. It was first settled in 1790. By the time of the 2010 census, it occupied a land area of less than one-half square mile and was home to about 1600 people.

Several companies mined bituminous coal and iron in the region, beginning in about 1850. Later, a steel manufacturing plant went into business between the Kiskiminetas River and Main Street to produce nails and spikes. The plant grew and made larger-scale steel products, such as beams, hoists and roof decks. In the mid 20th century, people knew the plant as the Apollo Steel Plant, which a newly arrived Pennsylvania resident, David Lowenthal, acquired in about 1955.¹²³

In 1957, Dr. Zalman Shapiro, a resident of suburban Pittsburgh, collaborated with Lowenthal, who lived next door, and others to form a closely held private corporation called Nuclear Materials and Equipment Corporation (NUMEC). Shapiro was a metallurgist and a senior manager at the nearby Bettis Atomic Power Laboratory that supported AEC's Office of Naval Reactors. He was active in various Jewish organizations in Pittsburgh and nationally. He said he formed NUMEC to take advantage of a constellation of interests, namely, a growing market for uranium fuel for nuclear reactors, his specialized metallurgical skills and his proprietary knowledge of how to produce uranium fuel.

On May 31, 1958, Lowenthal's Apollo Steel Company, together with the American Nut and Bolt Fastener Company (both incorporated in Pennsylvania), merged with San Toy Mining Company, which was incorporated in Maine. San Toy was the surviving company in the merger, and it changed its name to Apollo Industries, Inc. The president of Apollo Industries was Morton Chatkin, a former business partner of Lowenthal in Ohio; the executive vice-president was Ivan J. Novick; and the secretary and treasurer was Lowenthal. These three men, along with 14 others, including Zalman Shapiro, comprised the board of directors of Apollo Industries.¹²⁴ Novick later served as national president of the Zionist Organization of America (ZOA) from 1978 to 1982.⁸ He also served as a liaison between the administrations of Prime Minister Menachem Begin and President Ronald Reagan.¹²⁵

On May 17, 1962, Apollo Industries incorporated a subsidiary known as Raychord Corporation, which henceforth operated the old Apollo Steel Plant under the name Raychord Steel.¹²⁶

The steel industry's decline in the 1950s created unemployment in the region. With an overabundance of semi-skilled workers, the town of Apollo was ready to accept any enterprise that brought new jobs, including Raychord Steel and NUMEC.

Lowenthal's 2006 obituary told of an adventurous life. He was born in Poland in 1921, immigrated to America in 1932, served in the U.S. armed forces in World War II and became a U.S. citizen in July 1945. He was in charge of defense on board the ship

Exodus 1947, a converted American merchant ship bought by the Haganah, the underground Jewish military of the day, to ferry Jewish immigrants to Palestine. Otto Preminger immortalized the story of the *Exodus* in his 1960 movie of the same name. After the *Exodus* was seized and its passengers returned to Europe, Lowenthal helped to purchase another ship, the *Pan York*, which was to ferry thousands of Jewish Europeans to Palestine. When the British denied *Pan York* entrance to Palestine, it docked in Cyprus, where the British arrested and imprisoned Lowenthal. He escaped to Palestine and served in the Haganah during Israel's 1948 war of independence. He served under Meir Amit, who later headed Military Intelligence in Israel from 1962 to 1963 and then Mossad, the CIA's counterpart in Israel, from 1963 to 1968.¹²⁷

Lowenthal's obituary included praise from some of his friends. "I remember you as a big Zionist," Meir Amit wrote near the end of Lowenthal's life, "always ready to do things in order to help Israel. You have gained many friends in our country; they will never forget you and your positive approach." Zalman Shapiro said of his partner in NUMEC, "He had lots of innovative ideas and he tried them." Lowenthal's obituary said he was a close friend of David Ben-Gurion and Golda Meir.

Lowenthal and his sister traveled alone to the United States to join their father after the death of their mother in Poland. As a teenager, he suffered from tuberculosis and spent four years in a sanitarium, mostly reading. He later called those years his "informal education" because he never attended college. His business career began with the Mount Vernon Bridge Co. in Ohio. In 1955, along with two others, he bought the dormant Apollo Steel Co. in Apollo and restarted production.

About the time he bought Apollo Steel in 1956, Lowenthal visited Israel when it was making decisions about foreign-sourcing its nuclear materials and technology.¹²⁸ In 1957, Lowenthal and Shapiro formed NUMEC, and within weeks, Shapiro applied for NUMEC's first nuclear materials license from the AEC to operate a manufacturing plant for uranium fuel in one of the buildings earlier occupied by Apollo Steel. John Hadden, the former CIA Station Chief in Tel Aviv, later noted the unusual coincidence of events; i.e., the AEC issuing its first license to handle highly enriched uranium to a private company recently financed by a group of leading Zionists at a time when Israel was intent upon acquiring nuclear weapons. He thought Israel pursued both plutonium and uranium-based weapons from the start of its quest for the bomb.¹²⁹

The FBI watched Lowenthal for a number of years. The Bureau has rebuffed most attempts to obtain its records on Lowenthal. However, Grant Smith learned from the FBI that as late as 1968 and 1969 Lowenthal had ties to "the highest levels of Israeli intelligence" through contacts in the U.S. and on his monthly trips to Israel.¹³⁰ In 1968, FBI recorded that Lowenthal's contact was the Defense and Armed Forces Attache, General David Carmon, in the Israeli embassy in Washington, DC. Just before his service in that capacity, Carmon was Israel's Deputy Director of Military Intelligence. In 1968, Carmon participated in top-secret negotiations with the U.S. Department of Defense for the sale to Israel of Phantom jets (F-4s) and advanced conventional weapons, arguably contingent on Israel's forswearing nuclear weapons.¹³¹

Shapiro's first priority for NUMEC was to construct a manufacturing plant for uranium fuel for nuclear reactors. Local people viewed the new plant as a boon to the economy and did not ask many questions about its mission or its hazards. In exchange for NUMEC stock, Lowenthal's Apollo Steel Company (later Apollo Industries and then Raychord Corporation) provided a substantial portion (50,000 square feet) of its steel plant in Apollo to house the uranium plant. Apollo Industries also invested money in NUMEC stock.¹³²

Shapiro credited NUMEC's three vice-presidents for the company's successful startup. Dr. Frederick Forscher was a metallurgist and nuclear engineer who worked with Shapiro at Bettis. Forscher was a naturalized American citizen. His parents died in a Nazi concentration camp.¹³³ Oscar S. Gray was a lawyer for the U.S. Department of State before joining NUMEC as its secretary and treasurer and, later, general counsel. At the State Department he was honored for drafting and reviewing several hundred international agreements, including all basic bilateral military assistance agreements made by the United States between June 1951 and March 1957.¹³⁴ Dr. Leonard P. Pepkowitz was a radiochemist and materials expert who worked in the Manhattan Project, Los Alamos National Laboratory and Knolls Atomic Power Laboratory before coming to NUMEC.¹³⁵ Like the Bettis Laboratory, the Knolls Laboratory supported AEC's Office of Naval Reactors. All three of these vice-presidents served on the board of directors of NUMEC.

In 1965, the other members of NUMEC's board of directors were Leon Falk, Director of Duquesne Light Company;⁹ Benjamin Rosen, Pittsburgh attorney; Phillip Powers, former president of Western Pennsylvania Power Company; and Dr. William Fondiller, consulting engineer (metallurgist) and former vice-president and treasurer of Bell Telephone Laboratories.¹³⁶ The outside directors were self-proclaimed figureheads that later denied having knowledge of or involvement in NUMEC's operations and clientele.¹³⁷

NUMEC began building its uranium processing plant in the Apollo Steel facility in 1957. The plant produced fuel for nuclear reactors owned by government and commercial entities, both foreign and domestic. Several years later, NUMEC built a second plant in Parks Township, also on the Kiskiminetas River, a few miles from Apollo. The Parks facility produced mixed oxide (plutonium and uranium) fuels and metallic fuels for nuclear reactors. At Parks, NUMEC also fabricated novel devices from uranium and plutonium metals and other radionuclides. NUMEC used a portion of the Parks site for burial of low-level radioactive waste. The waste disposal site contained a number of burial pits and became known as the shallow land disposal site. The capital invested in the two plants (Apollo and Parks) was much less than the cost of the materials they processed, a fact that contributed to later suggestions that the company was a front for other purposes.

The steel plant was of simple construction that dated back to the 1850s. It was two stories tall with a sheet metal roof and walls of brick and block. The uranium plant shared two walls with the neighboring steel fabricator. Shapiro said he based his designs of

laboratory equipment and effluent controls in the uranium plant on those used in government laboratories at Oak Ridge and Bettis. The uranium processing equipment was of novel design of his conception, for which he was respected as a leader in the field.

NUMEC's 1957 application to the AEC for a license to possess uranium described the safety, health and security measures that it would include in the design and operation of the plant to protect the uranium, the workers, the public and the environment. When AEC issued a license for NUMEC to operate the Apollo plant, it referenced the safety analysis report (SAR) that accompanied the license application. Thus, the SAR became part of the license. The application was amended many times to reflect changes in the scope of services offered by NUMEC and the safety and security features required by the AEC.



The Uranium Plant at Apollo

After reviewing NUMEC's license application for the plant at Apollo, the AEC issued a license in July 1957 that allowed the company to conduct operations with natural uranium. Further improvements in the plant in the following months led to AEC's December 1957 approval of operations with enriched uranium. The Apollo plant accomplished many firsts in the U.S. nuclear industry: It was the first commercial facility licensed to convert uranium hexafluoride to uranium dioxide powder; it achieved the first commercial production of coated particle fuels; and it was the first to develop the dry pressing process for power reactor fuel pellets.

The interior design of the uranium plant provided three kinds of spaces that were interspersed around the first and second floors, namely, laboratories, production areas and storage areas. Most operational personnel had access to the production areas, as did escorted visitors, if they could stand the smell of the ammonia, a principal ingredient in the chemical process that converted the incoming uranium hexafluoride to the outgoing uranium dioxide.

The company controlled access to the laboratory spaces in order to protect the sensitive laboratory equipment from routine worker traffic and from the environment of the production area. The laboratory equipment supported manufacturing processes, measured production effectiveness and controlled the quality of the final uranium products. NUMEC allowed only limited access to locked vaults where finished reactor fuels were stored before shipment to clients. Incoming and outgoing shipments occurred at the plant's single loading dock.

The Apollo plant included chemistry hoods, glove boxes, exhaust fans and filters for dusty or gaseous stages of the processing line. These devices protected workers from inhalation and ingestion of uranium. The company used sealed containers for pellet and powder forms of uranium dioxide to protect workers from inhaling dust.

Uranium is hazardous to human health only if it is inhaled or ingested. Any that enters the body has the potential for both chemical and radiological toxicity. The most sensitive organs are kidneys and lungs. External exposure to uranium is not harmful because the alpha particles it emits travel only a few centimeters in air; obstacles as thin as skin or a sheet of paper are adequate to absorb alpha particles. The isotope U-235 emits an inconsequential amount of gamma radiation in addition to alpha particles. Bare hands are safe for handling well-packaged uranium. The radioactivity of HEU provides no impediment to its theft.

Highly enriched uranium is susceptible to an accidental criticality. That is, the collection of a relatively small volume of HEU in the right geometry (a critical mass) can lead to a spontaneous chain reaction, a so-called criticality accident. Criticality accidents produce lethal quantities of neutrons and other fission products that can injure or kill people in the immediate vicinity. They have occurred in the early stages of nearly every nuclear program in the world, including the United States. They typically generate enough heat to quickly disassemble the critical geometry. To preclude formation of a critical mass in its production processes for HEU, NUMEC collected and stored the material in prescribed arrays of small metallic containers. Design of the arrays of such containers prevented criticality accidents while processing, storing or transporting the HEU. Because such containers were small and sealed, it would have been convenient to pick them up and carry them off, one or several at a time. Operating experience in government facilities handling large quantities of enriched uranium and plutonium has shown that holdup of waste products in ductwork or other confined spaces can create an inadvertent criticality concern. Although NUMEC said holdup could explain some of the material that would eventually go missing at Apollo, no one ever said that such holdup was of sufficient size to create a criticality concern.

In December 1957, AEC modified the license for the plant at Apollo to allow NUMEC to possess and house up to 20 kilograms of U-235 contained in uranium of any enrichment. The AEC allowed only specific processes to be conducted with this uranium, namely, research and development related to fuels for nuclear reactors, recovering U-235 from scrap materials and manufacturing nuclear reactor fuels.

After it obtained this license, NUMEC began producing uranium dioxide at laboratory scale in small batches for experimental purposes and to develop its process design. In addition, soon after startup, in order to establish its business reputation and its cash flow, the company undertook difficult chemical operations to recover U-235 from scrap materials produced by government and other commercial facilities.¹³⁸

The plant in Apollo began commercial operations in 1959, after Shapiro and Forscher succeeded in developing novel equipment for manufacturing nuclear reactor fuel. Their process converted uranium hexafluoride of any enrichment to uranium dioxide of that same enrichment. Their conversion process and equipment were “sensitive nuclear technology” because they were novel and because they allowed their owner to process

uranium into fuel for burning in a nuclear reactor to produce plutonium. Foreign dissemination of such information required formal approval by the AEC and the U.S. Department of Commerce. Shapiro and Forscher also developed proprietary technology for commercial production of hafnium and zirconium, essential ingredients for nuclear reactor control rods and fuel cladding, respectively.

NUMEC's uranium processing business grew rapidly as word spread about the quality of its product. As a result, the plant soon filled with piping, tanks, glove boxes and various complex machines for processing gaseous, liquid and solid uranium compounds. The Apollo plant could not produce metallic uranium, the form needed for an atom bomb, but the plant at Parks Township could. NUMEC's income grew more than tenfold in its first seven years of operation, from less than \$700,000 in its fiscal year 1957 to about \$7 million dollars in its fiscal year 1965. In that same time, its long-term debt grew to nearly \$5 million.¹³⁹

In the early years of NUMEC's operations, only the AEC could own uranium. Thus, when NUMEC processed uranium for a commercial client, the client had to first lease the uranium from the AEC. NUMEC had to keep track of the uranium it received and shipped, and it had to pay the client for any that it lost during processing. These payments were called fines, but they were really reimbursements for the cost of the uranium charged by the AEC.

Uranium was expensive, so there was a strong economic incentive to provide careful accounting of uranium inventories because commercial firms such as NUMEC had to account to their shareholders for profits and losses. A 1964 amendment of the Atomic Energy Act allowed SNM to be owned by private companies, including NUMEC and its commercial customers. The 1964 Act did not change the economic incentive for protection of SNM against theft.¹⁴⁰

Enriched uranium hexafluoride came to Apollo in large steel cylinders from AEC's enrichment plants at Oak Ridge, Tennessee and Portsmouth, Ohio. Natural uranium hexafluoride came to Apollo from the plants that processed ore before it was sent to the enrichment plants. The manufacturing processes at Apollo were essentially the same for uranium of any enrichment.

Some of the uranium dioxide was packaged and shipped to customers in powder form. For other clients, NUMEC applied heat and pressure to the powdered uranium dioxide to produce small, cylindrical, ceramic pellets in a process known as sintering. The processing and form of HEU fuels that NUMEC produced for naval reactors were classified.

Workers at the end of the production line for commercial fuel manually stacked ceramic pellets of low enriched uranium into metal tubes made of stainless steel or a zirconium-based metal alloy known as Zircaloy. Then they welded the tubes shut to produce finished fuel rods for commercial nuclear power plants.

In its first seven years of commercial operations, NUMEC undertook contracts for the production of reactor fuel of low and highly enriched uranium dioxide and contracts to

manufacture HEU fuel for naval reactors. One of NUMEC's larger contracts began in 1964 and involved the manufacture of fuel wafers of HEU (93 percent U-235) for the Shippingport Nuclear Power Plant.¹⁴¹ Bettis Laboratory and AEC's Office of Naval Reactors built the Shippingport plant for Duquesne Power and Light Company in Pennsylvania. Shapiro developed the fuel design for Shippingport. NUMEC's early contracts also included uranium fuel of various enrichments for research reactors in the U.S. and abroad.

The contract for the Shippingport fuel was unexpected because Shapiro and Forscher angered Admiral Hyman Rickover, the head of AEC's Office of Naval Reactors, by their leaving Bettis in 1957 to form NUMEC. When they left, Rickover banned contracting with NUMEC in spite of Shapiro's explanation that NUMEC could improve the manufacturing and the quality of naval reactor fuel. Rickover relented when Shapiro found a new way to produce high quality hafnium for control rods in naval reactors. Soon, NUMEC was a major supplier of naval reactor fuel and the navy's primary source of hafnium.

Despite their mutual dependence, the AEC's Naval Reactors Office and NUMEC disagreed over safety, quality and cost issues for years. Furthermore, Naval Reactors demanded higher performance of NUMEC than did other NUMEC customers and the AEC regulatory staff. As journalist John Fialka reported, for example, "the losses at Apollo and other submarine fuel facilities [were] so embarrassing that Admiral Rickover [looked] for ways to prevent the release of MUF [material unaccounted for] numbers."¹⁴²
¹⁰ Also, in September 1965, AEC Assistant General Manager Howard C. Brown, Jr. recorded Shapiro's telephonic description of a spat with Rickover, "[Shapiro] said the situation vis-à-vis NUMEC and Admiral Rickover had worsened and he felt he was essentially being boycotted insofar as further Navy nuclear fuel work was concerned."¹⁴³

In 2006, the Department of Energy (DOE) declassified a report that listed by year the amount of HEU the AEC and its successors produced at the Portsmouth Gaseous Diffusion Plant. That report includes the 97.7 percent enriched uranium used in naval reactor fuel.¹⁴⁴ According to that reference and others, Portsmouth was the only source of this level of uranium enrichment, and that uranium was used exclusively for U.S. naval reactor fuel.

The Portsmouth Gaseous Diffusion Plant was established in 1951, the last of three such plants in the U.S. Its initial mission was to produce HEU for use in nuclear weapons (typically, 93 percent enrichment). In the 1960s, it began serving the nuclear power industry with lower enrichments of uranium (typically, 3 percent enrichment). In 1962, Portsmouth began to produce the first HEU anywhere in the world with an enrichment of 97.7 percent. In 1964, it ceased producing HEU for nuclear weapons but continued to produce HEU of 97.7 percent enrichment. All of this very highly enriched uranium went to the naval nuclear propulsion program.

In addition to the HEU processed at Apollo for naval reactor fuel, NUMEC also processed HEU for other government and private clients, both foreign and domestic. The enrichment of the HEU for such contracts ranged from 20 percent to about 93 percent.

The inventory records that survive show that from 1959 through 1965, the Apollo

plant processed a total of 14,693 kilograms of U-235 in the form of high and low enriched uranium. The records show that NUMEC processed about 5,500 kilograms of HEU at Apollo from 1959 through 1965, including fuel for the nuclear navy.

During these early years, AEC inspectors observed that NUMEC employed sloppy accounting methods that depended upon borrowing material from follow-on contracts to make up for material lost in preceding contracts. In September 1964 Charles Keller of AEC's Oak Ridge Operations Office (OROO) wrote to Shapiro to say that OROO had attempted a routine physical inventory at Apollo and failed. Keller said, "Cross-over between different jobs has occurred ... definitely contrary to the provisions of Part 700 of the AEC Manual ... we are required to inform you that your records are not in condition for audit."¹⁴⁵

Although contrary to good practice and the AEC Manual, crossover between contracts worked well for NUMEC so long as production efficiency (yield) on individual contracts was high and new contracts kept coming. However, by taking advantage of crossover among contracts, NUMEC was coming up short on a cumulative basis. The company reported losses of uranium on individual contracts and then paid the client for discrepancies between receipts and shipments. Such payments came from the profits of the company or from bank loans. Loans to a financially marginal startup enterprise became a source of concern in later investigations of NUMEC's operations.

By the mid 1960s, the uranium plant in Apollo was running on a routine basis. However, the measures in place to control and account for the uranium did not fully satisfy AEC inspectors. NUMEC employed both design features and administrative controls to contain uranium in process and in storage to protect workers and the public from inhaling or ingesting it. Criticality safety measures were in place; contracts were growing; and relations with AEC's Office of Naval Reactors were stable but acrimonious. The AEC had approved NUMEC's security measures but those measures were insubstantial. AEC's regulatory staff monitored the security and the safety of the plant. Then the troubles began.

⁸ The ZOA was a member of the American Zionist Council, progenitor of the American Israel Public Affairs Committee (AIPAC), which is widely understood today to be the most influential organization affecting America's relationship with Israel.

⁹ A June 13, 1968 internal FBI memorandum identified Falk as a multimillionaire who served 10 other organizations at that time as an officer or director.

¹⁰ In the early days of the nuclear program, the term MUF was used to denote differences between book inventory (what the accounting system said should be in a plant or an area of a plant) and physical inventory (what was actually there). Later the MUF term was replaced with the term inventory difference or ID. Both DOE and NRC use the ID terminology today.

Part Two: Missing, Not Lost

Chapter 4

Where Oh Where (1965)

In early 1965, AEC began to watch operations at Apollo more closely because of NUMEC's mounting difficulty with uranium control and accountability. Before 1965, AEC thought the accounting problems owed to the plant's novelty and complexity, but significant additional losses of HEU occurred in early 1965 on a contract with Westinghouse Astronuclear Laboratory. The Astronuclear contract began in 1962, ended in 1964 and accumulated losses much larger than the norm.

The Astronuclear contract presented particular difficulty by requiring the production of small, spherical, coated pellets of 93 percent enriched uranium carbide, something no one had attempted before. Even though NUMEC took the novelty of the project into account when it bid for the contract with Westinghouse, its losses of HEU during production were higher than expected.

The uranium carbide was to fuel a prototype nuclear rocket engine called NERVA that Westinghouse was developing for the AEC. The uranium carbide was more difficult to handle than the uranium dioxide normally produced at Apollo. At the start of the contract, Westinghouse provided NUMEC with 1012 kilograms of HEU, which was the total amount needed to produce the amount of uranium carbide that was specified in the contract. Westinghouse leased the HEU from AEC.¹⁴⁶

NUMEC experienced very poor yield in working with the uranium carbide; i.e., less than half of the HEU that entered the manufacturing process came out as useable product, while the rest ended up as scrap. The HEU in the scrap was difficult to extract or assay because of its novel chemistry and physical form. In addition, NUMEC could not borrow from the next contract in line to make up the shortfall of uranium, as it had been doing with preceding contracts, because the AEC stopped production at Apollo when it found out about the missing uranium on the Astronuclear contract. Thus, there were no new projects in the plant to make up for uranium losses on the Astronuclear contract.

NUMEC was the first to detect and report a significant shortfall of uranium on the Astronuclear contract. When AEC learned of the problem, it ordered the company to cease operations and commissioned an independent inventory of all the uranium in the plant. The AEC's Oak Ridge Operations Office began the inventory on April 30, 1965 and soon confirmed that there was a significant shortage.¹⁴⁷ A one-page summary of the results of that inventory survives. It records the total throughput of HEU from July 1, 1959 to June 30, 1965. It shows that in that six-year period the plant processed 4,068 kilograms of U-235 contained in 93 percent enriched HEU and 643 kilograms of U-235 contained in 97.7 percent enriched HEU, with an inventory difference of 99 kilograms of U-235. The document does not indicate whether it was prepared by NUMEC or Oak Ridge.¹⁴⁸

Inventory difference (ID) for a uranium processing facility like Apollo is defined as book inventory minus physical inventory minus removals, where removals include product shipped to clients, measured effluents and measured discards during a particular

period. In equation form this definition is written as follows:

$$\text{ID} = \text{Material on the books} - \text{material in the plant} - \text{removals}$$

Typically, when a significant ID occurs, personnel at the facility stop what they are doing and analyze and explain the ID to the best of their ability. Clients and regulatory authorities oversee that process. This process occurs whenever inventory differences are outside statistical control limits. One motive for careful review of IDs is that the facility has to pay the client for the missing material no matter the cause. Typical sources of inventory differences are as follows:

$$\text{ID} = \text{measurement error} + \text{holdup} + \text{sneak discharges} + \text{unknown}$$

Measurement errors might occur due to a faulty instrument, statistical variation in instrument readings or human error in recording a reading from an instrument. Holdup refers to material that could stick to the pipes, structures or equipment in a plant and not be accessible for measurement. Sneak discharges are effluents and disposals that were not monitored and recorded when they occurred. For example, a filter in a glove box could have developed an undetected hole that allowed particles in a gaseous effluent to escape monitoring.

Every uranium-processing facility tries to avoid the “unknown” category of inventory difference because if no other explanation can be found for material that remains in that category, then the personnel at the facility and their overseers must consider whether the material has been stolen.

As noted earlier, the term “material unaccounted for” or MUF was used in the early days of the nuclear program in the United States. The term inventory difference has replaced the term MUF in today’s parlance, but in the transition between terms some people and facilities continued to use the old terminology. Sometimes, people used the two terms to mean different things, which were not in keeping with the definitions. Where misuse of these terms causes potential confusion in this history of material accounting at NUMEC, and its oversight by others, parenthetical statements are provided to help the reader understand what was being said.

One last point about inventory differences is that they tend to grow over time, i.e., the cumulative ID might go up and down in the short term due to statistical variations or changes in plant operations, but over time the cumulative ID trends upwards due to the holdup category of ID or to a continuing unidentified loss of material from the facility. However, if a facility operated well and if there were no theft, then when the facility is decommissioned and the material in holdup returns to inventory, the cumulative ID should trend back to zero, or near zero. The importance of this last point will become clear as this NUMEC account unfolds.

In mid 1965, the AEC set about to find the missing HEU identified by the Oak Ridge team. On July 21, 1965, Assistant General Manager Howard Brown and others from AEC met with NUMEC officials in Apollo. Shapiro and his staff argued that buried wastes and air filters from the uranium plant contained enough uranium to more than make up for prior losses and “result in the Commission owing them money.” They asked

the AEC representatives to accept their word for the missing material and not press for its recovery in order to avoid embarrassing the company in its ongoing expansion efforts. The AEC staffers responded that they “were nonplussed by the disclosure of information which had been known [by NUMEC] for some time.” They directed NUMEC to get its house in order and propose a financial settlement.¹⁴⁹

Charles Keller attended that July 21, 1965 meeting with NUMEC in Apollo. His notes from that meeting, based on statements by S. A. Weber of NUMEC, show that between October 1, 1959 and September 30, 1964, NUMEC received 3,982 kilograms of HEU. Although Keller’s notes did not say so, it is safe to assume Weber reported the amounts in kilograms of U-235 in the form of HEU because the receipts covered a variety of enrichments in the HEU category.

Keller also kept notes of an August 10, 1965 meeting wherein Shapiro told the AEC commissioners that NUMEC processed 5,068 kilograms of HEU with enrichment greater than 75 percent during the years 1961 to 1965. Again, this amount would have been expressed as kilograms of U-235 because of the variable enrichments. Adding Weber’s FY 1960 tally to Shapiro’s total for 1961 to 1965 brings the total from start of HEU processing in October 1959 through December 31, 1965 to about 5.5 metric tons of U-235 contained in HEU with greater than 75 percent enrichment.¹⁵⁰

The commissioners summoned Shapiro and Forscher to the August 10 meeting at AEC Headquarters in Germantown, Maryland to make certain that NUMEC’s most senior managers understood the gravity of the situation. At the meeting, NUMEC supplemented its earlier supposition that the missing HEU was contained in buried wastes by stating that some of the missing material was also held up in the scrap associated with its uranium carbide manufacturing process. The AEC staff tested that hypothesis by directing Oak Ridge to perform radiochemical analysis of samples of the scrap. That analysis failed to confirm NUMEC’s estimate or to account for the missing material. In November, because of Oak Ridge’s findings, AEC sent its own material accounting experts to Apollo. They supervised another plant-wide inventory supported by independent laboratory studies to try to account for the lost uranium.

AEC Chairman Seaborg was involved directly in AEC’s investigation of the missing uranium. He did not delegate his decision authority to others. For example, in a meeting between the AEC commissioners and their staff on August 9, 1965, he recommended billing NUMEC for \$650,000 based on the first audit by Oak Ridge. Later information proved that amount insufficient to pay for the missing uranium, but the fact that Seaborg could make a dollar estimate shows that he knew the details of the case.

In the August 10 meeting between the AEC commissioners and the two senior NUMEC officials, Seaborg told Shapiro and the others that he had “extreme concern” about the missing material. The switch in emphasis from money to missing material reflected the pressure Seaborg was under from the Joint Committee, which was more concerned with where the material went than who was going to pay for it. Seaborg went on to show a special interest in helping Shapiro explain away the missing uranium. “The Chairman said it certainly seemed desirable to give consideration to an investigation of the

matter. He asked if NUMEC felt that the 52 kilograms of material under discussion might already have been delivered to the Commission in the NERVA element batches. Mr. Shapiro replied that it was possible.”¹⁵¹

Shapiro told the commissioners that the Astronuclear contract was NUMEC’s first production experience with uranium carbide and its first large contract. He apparently forgot Shippingport, which was a much larger contract. He explained that uranium carbide is pyrophoric; i.e., it reacts with oxygen in air or water vapor and burns. Because of the pyrophoricity, special precautions were taken inside the glove boxes where the work was performed. His lengthy explanation emphasized that no one had ever produced reactor fuel of this type.

Shapiro also told the commissioners that the Astronuclear project didn’t go as well as he had expected based on previous work at laboratory scale, and the work dragged on longer than he expected. He said he undertook an investigation after learning that losses during processing exceeded his estimates (i.e., the yield was lower than expected). He found that the high amount of recycle in the process had tied up his scrap recovery facility; thus, the plant could not achieve its normal scrap recovery rate. Shapiro then provided a complex description of the chemistry of scrap recovery. He also said that his only mistake was hiring the wrong people to account for his nuclear materials, and he claimed that NUMEC had been honest in its dealings. He noted that in earlier years NUMEC paid AEC up to \$1 million in fines (cost reimbursements) for other losses of enriched uranium. He concluded his presentation by saying NUMEC was responsible for finding the missing material.

One of the details in Shapiro’s presentation was the fact that the Astronuclear contract required his technicians to use a plasma torch inside a sealed glove box to make spherical particles of uranium carbide. During production, the particles acquired an electrostatic charge and stuck to the inner surfaces of the glove box, blocking the windows through which the technicians viewed and controlled the torch. Technicians had to wipe the inner surface of the windows with wood-based fiber towels known as Kimwipes. NUMEC disposed of the Kimwipes as low-level radioactive waste because they were contaminated with uranium-carbide dust. Shapiro told AEC he thought the Kimwipes must contain much of the missing HEU. The AEC told him to prove it by exhuming the low-level radioactive wastes that NUMEC had buried in its nearby disposal site.

On August 26, 1965, Keller sent a telex to Douglas George, AEC’s Director of Nuclear Materials Management, and others at AEC headquarters to express his concerns about Shapiro’s proposal.¹⁵²

There is a serious question in my mind that the buried materials will contain the quantities postulated by NUMEC... . NUMEC has been less than candid in their dealings with us on nuclear materials management. Their internal controls and records on uranium are of such a nature that I will not repeat not state that they have satisfactorily accounted for material entrusted to them and that there is no cause for concern. It is my concern that prompted my statement at the meeting that if it were in my province to do so I would, as a prudent business man, stop all further deliveries of enriched uranium to NUMEC... .

Keller was not the only AEC official worried about the implications of the missing uranium. A September 2, 1965 memo from Lawton Geiger in AEC's Pittsburgh Naval Reactors Office to AEC's Oak Ridge Field Office indicated that officials in the naval reactors program were concerned about NUMEC. "In view of a NUMEC declared loss of 20 kilograms under a recent Bettis purchase order, the survey results (i.e., the Oak Ridge Survey of NUMEC covering the period July 1, 1963 – April 30, 1965) are of particular concern to me. The purpose of this memorandum is therefore to advise you of the circumstances of this loss and to solicit any additional information and comments you may have pertaining to this loss." NUMEC had neither returned the Navy's HEU nor reported discards of unrecoverable materials. NUMEC only provided a certification that it did not possess the missing material.¹⁵³ Finding HEU in Israel that could only have come from the naval reactors program would later be the basis for CIA's conclusion that it came from NUMEC.

Keller's concerns were confirmed a few weeks later when NUMEC's exhumation of the burial pits produced only 5.5 kilograms of U-235.¹⁵⁴ NUMEC eventually revised its estimate of the U-235 recovered from the pits to 7.4 kilograms.¹⁵⁵ The burial pits were in a waste disposal site approved by the AEC and called the shallow land disposal area. It was located a few miles north of Apollo, near NUMEC's Parks Township facility. The recovered uranium was added back into the Apollo plant inventory and did not figure in the AEC's final tabulation of inventory difference.

About the same time as the exhumation of the burial pits, Shapiro fired the radiation protection manager who approved the shipments of Kimwipes to the pits. He apparently took this action to show AEC that he was a strict enforcer of the rules or to deflect attention from the missing uranium. Ironically, he fired the person whose judgment had just been vindicated; i.e., there was not much HEU in the burial pits.

Years later, Keller recounted his assessment of the situation in 1965 in an interview with the FBI.¹⁵⁶

His gut feeling is that NUMEC probably lost a major part of the material through mishandling and sloppy operations. He said that he could not swear to this if he were asked where the material was but his opinion was that he just did not feel that they were smart enough to divert the material. Additionally, to divert the enriched uranium it would have to have been taken out of the plant and NUMEC had a guard force who were familiar with procedures for securing special nuclear material. Mr. Keller felt that a great deal of collusion would have been required to remove 50 kilograms of enriched uranium. It would also be difficult to ship this amount of material to another company with forged documents because this would require collusion with someone in another plant, which would be even more difficult.

Keller overestimated the difficulty of removing the uranium. As NRC would conclude later, it would have been relatively easy to remove the material from the Apollo plant. The volume of uranium is relatively small because its density is high, so its theft

would be easy to accomplish and to disguise. The density of uranium is 19 grams per cubic centimeter. Thus, for the purpose of illustration, 100 kilograms of uranium has a volume of about five quarts. For criticality protection, smaller containers would actually be used. For example, 10 containers of one-half-quart each, weighing about 10 kilograms apiece, would suffice to transport 100 kilograms out of the building. Such containers would have to be separated to prevent a criticality, but bare hands would suffice to guarantee the safety of the worker. Carrying one container in each hand, one person could remove 100 kilograms of HEU from the building in five trips, or five people could do it in one.

After opining on peripheral matters, Keller summarized for the FBI his assessment of the NUMEC situation in 1965.

He said essentially the problem in a nutshell is that the material was not there that the books said should have been there but there is absolutely no way to say how or where it went. His opinion is that sloppy plant operations, lack of records, and improper sampling probably [were] the reason for the loss. He indicated, however, that if he [were] planning to steal nuclear material he would use exactly this kind of operation, i.e., sloppy handling and accounting procedures.

About the same time as his FBI interview, Keller commented on an NRC review of the losses at NUMEC. "I found only one statement to which I might take exception and that [is] where it is stated that the AEC concluded that the 'loss' was not real. There were a number of us in the AEC who did consider the loss to be real but who were frustrated in our attempts to determine where or how the loss did in fact occur."¹⁵⁷ Keller was referring to the unexplained part of the inventory difference discovered in 1965. Reading between the lines, it appears there was more going on among the participants in the Apollo investigation than official records indicate. Either the embarrassing circumstances pressured the AEC hierarchy to end the investigation or someone pressured Keller to curtail his work.

In December 1965, Shapiro offered another explanation for the missing uranium. After failing to find it in the waste burial pits, he said it only appeared to be missing because NUMEC had consistently underestimated its losses of uranium in the scrap recovery process. Thus, more material had been returned to clients than they were due. This time, because the Joint Committee was pressuring the commission to conclude its investigation, AEC staff did not require Shapiro to prove his theory, as it had done in ordering exhumation of the burial pits and radiochemical analysis of the filters. Perhaps the staff was reluctant to challenge this latest assertion because the chairman had suggested it.

Instead, the AEC decided to let Shapiro pay for the missing HEU. Thus, in late January 1966, when AEC General Manager Robert Hollingsworth wrote to John Conway, executive director of the Joint Committee, to update him on the AEC's investigation, he told Conway that NUMEC owed \$1,134,849.34 to AEC to pay for the missing HEU. Hollingsworth noted that \$500,000 of that amount had already been paid.¹⁵⁸

Hollingsworth went on to summarize the various ways that NUMEC and AEC had tried to find the missing uranium, including exhuming waste burial pits and shipping a backlog of contaminated filters to Oak Ridge for analysis. Without saying why, he accepted Shapiro's latest theory that NUMEC had underestimated losses on a contract-by-contract basis. He described the relationship between the HEU missing on the Astronuclear contract and the total amount missing since the beginning of operations. He blamed inadequate material accounting procedures for the large amount of missing uranium. He concluded, "No evidence has been developed that would suggest that the losses occurred under circumstances that would indicate possible diversion."

On February 14, 1966, after testing its conclusions with the Joint Committee, the AEC senior staff, led by Assistant General Manager Howard Brown, briefed the AEC commissioners on the outcome of their investigation of NUMEC.¹⁵⁹ The staff told the commissioners how the Astronuclear loss compared to the cumulative eight-year loss of U-235 from Apollo.

During this period NUMEC had reported the loss of 149 kg and had made appropriate financial restitution for much of it. Following the April 1965 surveys, AEC staff had determined that NUMEC had lost an additional 29 kg over the 8-year period, which had not been reported, and possibly not realized by NUMEC... .

Mr. Brown stressed there was no way specifically to relate the losses ascribed to the WANL [Astronuclear] contract to the total plant figures over the period. He reviewed the WANL data for the Commissioners noting the company had been billed \$1.1348 [million] for the 61 kg of unaccounted-for material plus the 32 kg in inventory. He reiterated that although the 61-kilogram loss under the WANL contract was part of the total plant loss of 178 kg [since the beginning of operations], it was impossible precisely to establish the relationship between the two sets of data.

The AEC estimated when the losses occurred that eventually added up to the cumulative inventory difference of 178 kilograms, as shown in the following table, which attributes losses to fiscal years before the AEC's inventory ended in November 1965.¹⁶⁰ The row in the table for 1966 is for the first month of fiscal year 1966, i.e., October 1965. These estimates show that more than half of the 178 kilograms that were missing by late 1965 had gone missing before the end of 1963. Although discussions between AEC and Shapiro in 1965 centered on the complexity and difficulty of the Astronuclear contract, earlier contracts, which were not claimed to be novel or difficult, including naval reactor fuel contracts, were the source of a sizeable portion of the HEU that was missing by late 1965. The units in the table are kilograms of U-235 in the form of HEU. In 1977, ERDA issued a report on the history of IDs for strategic quantities of SNM, including AEC-licensed facilities such as Apollo.¹⁶¹ The results ERDA presented for Apollo are somewhat different than those presented by the earlier estimate compiled by AEC staffers James Lovett and Cal Solem. The ERDA results also show that a significant fraction of the total ID by the end of calendar year 1965 occurred by the end of 1964. This conclusion is confirmed by the January 25, 1966, Howard Brown memo to Chairman Seaborg, saying in

part, “The WANL contract to which the losses are charged was dated September 14, 1962, and delivery of product was made on October 31, 1964.”¹⁶² The significant IDs attributed in the table to 1965 and 1966 must have been corrections to prior estimates of inventory differences because NUMEC curtailed operations at Apollo while the Oak Ridge and AEC audits were underway in calendar year 1965.

Fiscal Year	AEC Yearly ID of U-235 in HEU, kg	AEC Cumulative ID, kg	ERDA-7768 Cumulative ID, kg
1957	0	0	0
1958	0	0	0
1959	2.4	2	0
1960	2.4	5	0.4
1961	9.6	14	5
1962	32.2	47	23
1963	56.1	103	52
1964	20.3	123	66
1965	44.2	167.2	101
1966	10.8	178	171
Total	178	178	171

Other items of interest in the AEC staff briefing of the Commissioners on February 14, 1966, as recorded by the Secretary of the Commission, were as follows:

[The NUMEC] case had convincingly demonstrated that fulfillment of a financial responsibility requirement might not really satisfy the AEC’s interest in special nuclear materials unaccounted for. Although the criterion remained valid in the sense that good SNM management was also good business, an accountability system based wholly on this criterion was, *pari passu* [at the same time], also based on a presumption of honesty. If the presumption of honesty were removed, the system did not present itself in the most credible light... .

[Mr. Brown, who did most of the talking] noted in this regard that if collusion between a shipper and a foreign government were assumed it would be theoretically possible to ship material abroad in excess of the amounts indicated in the company’s records. Because it was based upon a presumption of honesty and financial responsibility, the AEC materials accountability system might not reveal a deliberate and systematic attempt to divert materials in this manner. In addressing the system, however, Mr. Brown said it was important to bear in mind that the presumption of honesty was not a mindless assumption. Specifically, the Atomic Energy Act provided severe criminal penalties for violation of accountability procedures. The deterrent value of these penalties had been considered fundamental to the entire system of

domestic safeguards. Analogously, the international safeguards system relied upon formal sovereign guarantees of foreign governments... .

The basic Commission position [with the Joint Committee] should be that AEC had no evidence or suspicion that diversion had occurred; neither could the Commission say unequivocally that the material had not been diverted. Staff did, though, have a theory to support its lack of suspicion. Specifically, staff had determined during its two surveys of NUMEC that the company had consistently underestimated its actual process losses. Additionally the difference between actual and estimated losses appeared to have been passed on from completed jobs to new jobs... .

[AEC's material control expert, Dr. Sam McDowell,] agreed with Mr. Brown's conclusion that NUMEC simply had never taken the time and trouble to develop methods adequate to determine the amounts of material being lost through fabricating processes... .

[At the time the material was lost from Apollo] there had been a real [AEC] desire to accelerate the development of peaceful uses of nuclear energy both at home and abroad. Particularly with regard to the latter, the "peaceful atom" had been seen as an important, even vital, element of U.S. foreign policy. And most significantly, proliferation of a military nuclear capability had not been a decisive consideration... .

There was further brief discussion of [interviews of NUMEC employees] during which Mr. Brown indicated he would work out a suitable procedure with Mr. Hollingsworth to conduct the interviews... .

Mr. Brown said a second procedure the Commission might want to consider would be to request NUMEC to allow the Commission to examine the Company's confidential financial records... . An objection to this procedure was that the impact on NUMEC itself and the nuclear industry in general would, to say the least, be traumatic... .

Commissioner Palfrey suggested that Mr. Brown might informally suggest to Mr. Shapiro, President of NUMEC, that if the Company offered to make its financial records available to the AEC, the entire situation might be put in a more favorable light. The General Manager agreed. Mr. Brown said he would telephone Mr. Shapiro... .

Mr. Brown summarized staffs views on the NUMEC situation. The theory under which it appeared the losses could be accounted for made it, in Mr. Brown's opinion, unnecessary to involve the FBI formally in the matter... .

There was also brief discussion of the possibility that a premature leak of the NUMEC situation could lead to sensational and probably inaccurate press reports. The Chairman suggested the desirability of a prepared statement for contingency use in the public authorization

hearings [before the Joint Committee] should the NUMEC matter arise. The General Manager observed he had been informed by Mr. Conway that the staff of the Joint Committee had placed strict limitations on the correspondence regarding NUMEC.¹⁶³

These minutes reveal several oddities in AEC's handling of the missing HEU. First, the AEC did not discuss the elephant in the room, i.e., the record does not indicate that the commission and staff considered whether his allegiance to Israel and his ties to senior Israeli nuclear experts like Bergmann might have influenced Shapiro's behavior. The AEC knew by this time that Bergmann and Shapiro were collaborating in a joint venture between NUMEC and the Israeli AEC. However, there is no indication in the record before 1965 that the AEC knew of Shapiro's association with various Israeli intelligence officers. Perhaps the commission was embarrassed to admit that its safeguards system was highly vulnerable to anyone with a compelling motive to steal and could not conceive of such an unprecedented crime being committed on its watch. AEC Chairman Seaborg later said as much, "On the international level, what sense did it make to try to prove that the United States had failed to prevent the theft of enriched uranium from a facility under AEC supervision for use by Israel to make a bomb ... [so] the commissioners eventually found a way to avoid confrontation altogether."¹⁶⁴

Second, Brown was unequivocal in his statement that Shapiro could have diverted HEU to Israel had he been inclined to do so, despite the fact that Brown was similarly unequivocal in judging that the FBI need not be involved.

Third, the reason AEC staff gave for its conclusion that the material had not been diverted actually proved the opposite; i.e., the material could have been diverted. If someone at NUMEC had been underestimating the losses intentionally, they could have been spiriting away a little HEU every now and then and either storing it in the vaults or taking it offsite. The company had to pay a nominal amount for losses that were not reconciled on each contract, but the HEU was priceless if it served to jump-start the Israeli nuclear weapons capability thereby affording Israel time to build its own uranium enrichment facility as an adjunct or backup to the plutonium it expected to produce at Dimona. Although this conclusion is opposite from the one reached by the AEC staff, it is based on the same facts.

Fourth, if Shapiro or someone else diverted HEU to Israel, they did not do so for money as the commission presumed.

Fifth, the minutes demonstrate the commissioners' promotional attitude toward nuclear power: they were quick to deny public access to the unpleasant news that the staff's explanation rested solely on the presumption of Shapiro's honesty.

Finally, the commissioners and staff scorned the press and conspired to hide unclassified information about the missing HEU.

After the briefing, AEC's general manager sent a confidential report to the Joint Committee to describe what the commission had learned.¹⁶⁵ He said AEC's inventory concluded that the total cumulative loss between plant startup in 1957 and October 1965 was 178 kilograms of U-235. The report continued,

NUMEC's cumulative losses from time of plant start-up in 1957 have been higher than those determined by other companies having comparable operations [an enclosed table showed the losses at NUMEC were more than double the average losses for similar plants]. NUMEC underestimated its process losses. Adequate documentation of internal plant transfers was not maintained. Losses on individual contracts as they occurred were not established. As a result, this accumulation of unrecorded and unreported losses from prior contracts continued and became a recognized loss when the inventory was at a low level following completion of the WANL [Astronuclear] contract. It should be noted, however, that in their scrap recovery operation, as distinguished from their fabrication processes, the very nature of the operation results in the loss of contract identity.

The survey team concluded that a major contributing factor to these circumstances was that NUMEC management had not assigned the necessary caliber of full-time professional talent to the complex job of materials management.

The general manager did not tell the JCAE that his New York office had data showing that Shapiro violated contractual requirements by intentionally blurring the distinction between U-235 used on government contracts and U-235 used on commercial contracts. The New York office was concerned because NUMEC's liability for losses was less on government contracts than on commercial contracts.¹⁶⁶

The AEC told the JCAE that AEC staff and NUMEC management had agreed on how the company came to lose 84.2 kilograms of the 178 kilograms of U-235 in the form of HEU that were missing from Apollo. The following table lists the loss mechanisms identified by AEC staff and NUMEC for those 84.2 kilograms.

Loss Mechanism	Kilograms
Accidental fire in storage vault (1963)	3.0
Liquid waste discharged to river	58.0
Measured discards to burial pit	2.2
Discharges to air	14.0
Liquid waste in storage drums	2.0
Laundry, shoe covers, track-out	5.0
Subtotal	84.2
Unknown loss mechanism(s)	93.8

Total Inventory Difference (ID)	178
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The AEC concluded that 93.8 kilograms of the 178 kilograms of U-235 could not be explained, i.e., it was due to unknown causes. If there are no other possible loss mechanisms, it is prudent to examine whether someone could have stolen material in the unknown cause category. Neither AEC nor NUMEC had incentives to underestimate the known loss mechanisms that were part of the ID; no one wanted a high number for the unknown cause category.

The AEC's experts used NUMEC's calculations based on plant data to estimate the known material losses at Apollo. When addressing the unknown causes, the AEC did not distinguish between HEU that might have been lost through unidentifiable mechanisms and HEU that might have been stolen; i.e., the AEC could not tell if the missing HEU was stolen or was missing in some other way that went undetected by the experts from AEC, Oak Ridge and NUMEC.

If other loss mechanisms were plausible, such as more HEU returned to NUMEC's scrap-recovery clients or more HEU held up in cracks and crevices of the plant, AEC's experts would have named the other mechanisms and estimated the amount of U-235 associated with them. The people involved were the world's leading experts in uranium accountability. They labored for months trying to explain the missing 93.8 kilograms by any mechanism they could imagine other than theft. They failed.

In 1979, NRC experts reviewed the analyses performed under AEC auspices in 1965 and 1966. The NRC concluded, "Although the AEC survey team estimate for cumulative ID was probably the best that could be made under the circumstances, it is quite possible that the quantity of material loss which was not attributable to known loss mechanisms was, in fact, less than their 93.8 kilogram estimate."¹⁶⁷ However, NRC did not address whether NUMEC's estimates of the loss mechanisms (e.g., air and water effluents) were biased high to account for measurement uncertainties and to minimize its liability for so much missing HEU. George Murphy of the Joint Committee staff thought this was the case. He said that the estimate for liquid discharges to the Kiski River could only have been achieved if the plant had "run seven days a week, 24 hours a day since before the Revolutionary War."¹⁶⁸ In addition, discards were exhumed and measured, not estimated, thus removing another significant source of error from NRC's concern that known loss mechanisms may have been underestimated in 1965. The fact remains that AEC told Congress in 1965 that 93.8 kilograms of U-235 in the form of HEU were unaccounted for.

The AEC did not tell Congress that the amount could have been even larger. A more pessimistic contemporary estimate of the amount of missing U-235 did not make its way to the Joint Committee or to the commission. Douglas George, AEC's Director of Nuclear Materials Management (i.e., AEC's leading in-house expert on the matter), wrote a memorandum to Assistant General Manager Brown on February 9, 1966 to describe uncertainties in the conclusions of the AEC survey team. He said that NUMEC's losses

were higher than other plants doing similar work because NUMEC failed to maintain adequate documentation of internal plant transfers of uranium and to establish losses on an individual contract basis. He went on to say, “The 93.8 kilograms estimate of unaccounted for material assumes that NUMEC presented accurate data with regard to the amount of uranium received in conjunction with its scrap recovery operations.” He described how the AEC survey team had accepted NUMEC’s claim that its scrap recovery clients were consistently overestimating the amount of U-235 shipped to NUMEC by 10 percent. However, after 1965, the AEC began to monitor shipper-receiver differences and found that differences were typically 2 percent not 10 percent as claimed by NUMEC. George concluded, “What this means is that the 93.8 kilogram MUF [ID of unknown cause] at NUMEC could exceed 250 kilograms.”¹⁶⁹ No document has been found to show that Brown responded to George or conveyed this uncertainty to the commissioners. In the remainder of this account, no allowance is made for George’s prognostication. If he was correct, the amount of U-235 in the form of HEU that could have gone to Israel was understated by subsequent investigations.

The Joint Committee held a hearing on the NUMEC affair after AEC completed its investigation. At the hearing, AEC staff testified that the 93.8 kilograms of missing U-235 had benign explanations, along the lines of the letter that Brown sent earlier to the Committee’s Executive Director.

It is a mystery how Dr. Zalman Shapiro, president and founder of NUMEC and a leading expert in uranium metallurgy, while striving to make a name for his company and a profit for his investors, could run his plant so carelessly and with so little concern for the value of the uranium he was losing. He could have hired any one of a number of qualified material controls and accounting professionals to keep his company out of the mess it was in. His actions cost him and NUMEC their prestige in the industry and a lot of money to reimburse clients for lost uranium. Why was he so careless?

In February 1966, AEC Chairman Seaborg described this conundrum in a letter to Chairman Chet Holifield of the Joint Committee. “It appears that the losses for which NUMEC is now paying under its financial responsibility requirement are primarily the result of inadequate attention by NUMEC to generally recognized materials management methods.”¹⁷⁰ When Seaborg used the phrase “generally recognized” with Holifield, they both understood the words to refer to materials accounting methods that were routinely practiced at the time in both private and government nuclear facilities. All it would have taken was for Shapiro to hire one person that understood the generally recognized methods.

Seaborg’s admission begs a larger question. Did Shapiro mismanage those first nine years of operations at Apollo or were his actions intentional, designed to hide more calculated objectives? As Charles Keller, the leading expert from Oak Ridge in AEC’s investigation of Apollo, told the FBI, if he was planning to steal nuclear material he would use exactly this kind of operation, i.e., sloppy handling and accounting procedures.¹⁷¹

Based on the results of its investigation, AEC billed NUMEC \$1,134,849.34 for the

U-235 that had not been returned to Westinghouse under the Astronuclear contract. AEC reduced the payment to \$764,000 by giving credit for Astronuclear material still in inventory at Apollo that would eventually be returned to Westinghouse.

The \$764,000 charge was the value of the 61 kilograms of U-235 that were associated with the Astronuclear contract and were still missing. Thus, NUMEC paid \$12,500 per kilogram. Any prospective nuclear weapons state in those days would have paid that much; it was a pittance.

In addition to the \$764,000 payment, AEC staff told the commissioners that NUMEC had already paid earlier clients for “much of” the 149 kilograms of U-235 it had lost in contracts that were completed before the Astronuclear contract.¹⁷² These two amounts, 61 kilograms and 149 kilograms, add up to 210 kilograms. Thus, when AEC said “much of” the 149 kilograms, it must have meant 117 out of 149 kilograms since AEC staff told the commissioners in that same briefing that the total amount lost was 178 kilograms (i.e., 61 + 117).

Contemporary documents show that AEC required NUMEC to pay for all of the lost U-235 (the ID of 178 kilograms), not just the 93.8-kilogram portion of the ID for which there was no identified loss mechanism. Using the same unit price charged by AEC for the 61 kilograms lost on the Astronuclear contract and applying it to the 117 kilograms lost before that contract, shows that the total amount paid by NUMEC for the HEU that it lost through October 1965 was about \$2.2 million. On September 30, 1966, the AEC press office distributed a list of approved questions and answers concerning NUMEC which said the “losses over many contracts have totaled approximately 178 kilograms of uranium-235 having a value of about two million dollars.”¹⁷³

Shapiro confirmed that the total amount paid by NUMEC for missing HEU, up to and through the Astronuclear contract, was in the neighborhood of \$2 million. He told the commissioners on August 10, 1965, “in earlier years NUMEC had paid AEC up to \$1 million for material losses,” that is, losses that occurred before the Astronuclear contract.¹⁷⁴ The following table summarizes the HEU inventory differences and NUMEC’s payments through 1965.

Category of Missing U-235	Amount, kg	Payments
Cumulative Losses (ID) 1957-1965	178	
- Known Loss Mechanisms	84.2	
- Unknown Loss Mechanisms	93.8	
- WANL Project Portion of ID	61	\$764,000
Payments before WANL (estimate)	117	\$1,460,000
Total Paid for lost U through 1965	178	\$2,220,000

The \$2.2 million in total charges was more than four times AEC’s 1967 budget for research and development on nuclear material safeguards. The \$2.2 million exceeded the initial capital used to form NUMEC. The \$2.2 million was nearly ten times the company’s net income in its fiscal year ending September 30, 1965. The \$2.2 million was more than 50 percent of the company’s long-term debt of \$4.3 million at the end of its fiscal year 1965, i.e., before the final \$764,000 of the \$2.2 million in fines for missing U-235 was

levied.¹⁷⁵ However, \$2.2 million was a bargain for securing the material needed for a fledgling nation to build its first atom bombs.

There were at least two reasons for Israel to take a strong interest in obtaining HEU from Apollo in the early 1960s. First, the Israelis could not have been sure that the plutonium production complex at Dimona would work as designed and on their desired schedule. Thus, they would have wanted the uranium as a backup for use in uranium-fueled weapons in lieu of plutonium-fueled weapons.

Second, the HEU might have been used to boost the reactivity of the Dimona reactor. Higher reactivity would have been desirable for a variety of reasons. For example, in power reactors fueled by natural uranium and moderated by heavy water, such as the Canadian CANDU reactors, booster rods holding HEU are used to overcome the effect of “xenon poisoning” due to the buildup in the fuel of xenon gas following shutdowns. Xenon absorbs neutrons and acts an impediment to reactor restarts. Although this approach typically was not used in research or plutonium production reactors where timely restarts were not as important as in power reactors, it was an alternative for Dimona if needed to facilitate returns to power after unanticipated shutdowns. Another possible reason to use HEU booster rods in Dimona would have been to compensate for any neutron absorbers that were put into the core for irradiation purposes. For example, Vanunu said that in the 1970s and 1980s, Dimona produced tritium by neutron irradiation of lithium-6 targets in the reactor core.¹⁷⁶ Such a reason for the use of HEU booster rods was confirmed by an early report by Atomic Energy of Canada, Ltd. It described the use of HEU booster rods to compensate for the loss of reactivity due to the insertion of experiment rods in the Canadian NRX reactor, which produced plutonium and medical isotopes.¹⁷⁷ Consistent with the idea of using Apollo HEU in booster fuel to increase reactivity at Dimona, journalists and authors Raviv and Melman said the increased production capacity of Dimona was related to “The facility [being] fed by the extra uranium obtained from Zalman Shapiro’s NUMEC company in America... .”^{178, 11}

Whether the HEU from Apollo was used as weapons fuel or in Dimona booster fuel, either of these end uses would have justified the costs of establishing NUMEC, building the Apollo plant and paying the \$2.2 Million in fines for the missing uranium. As things worked out, even some of those costs were avoided.

In response to pressure from the Joint Committee after its hearings in early 1966, AEC staff undertook interviews of NUMEC employees to gain further insight into what might have happened to the missing uranium.¹⁷⁹ The interviews included 23 current and 14 former employees, ranging from company president Shapiro to plant workers, including two vault custodians and two security guards, plus two Westinghouse employees familiar with the Astronuclear contract.

Howard Brown asked Marcus Rowden, an assistant general counsel of AEC, to provide procedures to control the interviews. Rowden said the interviewers should tell the witnesses of their rights to refuse to testify and to have legal counsel of their choice

present for their interviews. He “emphatically stated that under no circumstances should the Interview Team attempt to obtain written statements from any of the witnesses. He said this was a matter which FBI specifically objected to.”¹² Other AEC staffers objected to Rowden’s instructions saying they would inhibit the witnesses and hinder the investigation. Rowden insisted on his way, going so far as to say, “if any information is uncovered which appears to be of pertinent value, the investigation should be discontinued until the facts can be related to HQ and, if necessary, the team might even have to come back to HQ to go over the situation.”¹⁸⁰ Rowden kept the Interview Team under tight control. He certainly was being careful in protecting the AEC in this delicate matter.

The principal conclusions of the interviews were reported by AEC, as follows:¹⁸¹

1. All knowledgeable interviewees believed the losses were sustained during processing operations [AEC did not define a “knowledgeable” interviewee];
2. Terminated employees were nearly unanimous in saying NUMEC’s low wage scale led to a high rate of employee turnover;
3. All interviewees said they knew of no instance of enriched uranium being stolen or otherwise diverted from Apollo, but several interviewees said it would have been possible to do so without being detected, for small quantities;
4. NUMEC management personnel stated that to the best of their knowledge there were no instances of deliberate commingling of enriched uranium assigned to different contracts;
5. NUMEC had a line of credit with Mellon National Bank and Trust Company in an aggregate amount not to exceed \$2.5 million. This line of credit had been used to make the first \$500,000 payment to Westinghouse for the material missing from the Astronuclear contract, on or about December 23, 1965; and
6. NUMEC had sufficient internal controls on shipments, which, in the absence of deliberate collusion, should ensure that the quantities reported on transfer documents were those quantities shipped.

The AEC did not pursue the third conclusion that it was possible to divert U-235 from Apollo. The fourth conclusion contradicted what AEC told the Joint Committee about one of the root causes of the missing material, i.e., there was commingling of material between contracts. The fifth conclusion would interest investigators for another decade, as described below—the issue was not who made the loan but who paid it back.

The employees interviewed by AEC in 1966 were not as forthcoming as one employee would be 15 years later with the NRC and the FBI. That is, no one told AEC in 1966 about encountering armed strangers on the dock one night in early 1965 loading canisters of HEU onto a truck in racks that had not been seen before, heading to a ship bound for Israel. Nor did that NRC informant tell AEC in 1966 that a NUMEC manager threatened him to keep his mouth shut, or else.

In September 1965, NUMEC's annual report to shareholders showed that the company was operating on credit, as follows:¹⁸²

- A \$2.5 million line of credit with Mellon National Bank,
- A \$1.5 million term note from Mellon payable in sixteen quarterly payments commencing April 1, 1967,
- \$1.8 million of convertible subordinated income notes issued to institutional investors due April 1, 1978, and
- \$509,500 borrowed from Pittsburgh National Bank under a participating loan agreement involving the Small Business Administration.

In its fiscal year 1965, NUMEC had annual revenues of about \$7 million and net income of about \$240,000. The company was more than \$3.8 million in debt before it used its line of credit with Mellon Bank to pay the fine owed for the missing uranium on the Astronuclear contract. The company was highly leveraged.

Whatever caused the sloppy accounting of uranium at Apollo, the situation quickly changed. As soon as AEC began to more closely scrutinize operations at Apollo, its inspectors were told by the employees they interviewed, "there was marked improvement in the nuclear materials control posture of NUMEC [as reported by] nearly all of the [NUMEC employees interviewed by AEC in early 1966]."¹⁸³

Material controls and accounting was not a difficult science in 1960—it never has been—and if NUMEC was quick to improve its material controls and accounting once AEC applied pressure to the situation, the question remains, why not sooner? However, the assertion that the company was quick to turn around its sloppy material control and accounting practices would soon be open to question.

In April 1966 Dr. Samuel McDowell authored a 23-page report, with 40 pages of attachments, describing AEC's late 1965 and early 1966 investigation and independent inventory of Apollo and AEC's subsequent interactions with NUMEC.¹⁸⁴ McDowell was a leader among U.S. material controls experts. A few years later, FBI agents would rely on his expertise in dealing with another aspect of the NUMEC investigation. In 1966, however, the key points in his report on AEC's 1965 and 1966 investigation of the missing uranium at Apollo were as follows:

- The total cumulative loss through October 31, 1965 was 178 kilograms of U-235 in the form of HEU;
- NUMEC had previously reported 149 kilograms as missing;
- The total cumulative loss as a percentage of throughput was larger than losses reported by other comparable facilities;

- It could not be stated with certainty that diversion did not take place, but no evidence was found to support this possibility;
- There were impediments to diversion, but there were weaknesses that would have facilitated diversion;
- The AEC investigation identified “all known loss mechanisms” and they totaled 84.2 kilograms of U-235;
- The loss of an additional 93.8 kilograms of U-235 owed to unknown mechanisms, but underestimates of known losses might account for 15 kilograms of U-235;
- NUMEC had not assigned the caliber of professional talent found by other companies to be necessary for adequate accounting of Special Nuclear Material;
- Foreign transfers of SNM placed reliance on the integrity of the shipper and the receiver for verification of quantities shipped; AEC provided no independent confirmation of the quantities transferred;
- Such controls, when properly implemented, should, in the absence of a deliberate collusion, ensure that quantities reported on transfer documents were indeed those shipped;
- Many of the inventory records requested by AEC were inadvertently destroyed by NUMEC supervisory personnel during a “clean up” campaign at the time of an employee strike that lasted from January 1 to February 25, 1964; and
- There was a “high degree of probability that WANL contract material was transferred to other contracts.”

Several things stand out among these conclusions. First, as AEC and FBI were to learn later, NUMEC prepared some large containers for shipment to Israel that could easily have hidden 93.8 kilograms of uranium, and NUMEC shipped them to Israel about the time that the uranium was discovered to be missing from the plant. If NUMEC diverted the HEU to Israel, then there was a *prima facie* case for collusion on both sides of the transaction. Second, inventory records were not supposed to disappear in cleanup operations; rather, they were required by AEC regulations to be protected for the life of the plant. Their destruction was a violation of AEC requirements for which AEC did not issue a citation. Third, McDowell did not accept Shapiro’s claim that there was no commingling of uranium among contracts.

Reading between the lines of the McDowell report, some of AEC’s influential commissioners and staff might have believed the missing uranium was held up in unrecoverable scrap or in cracks and crevices of the plant and its processing equipment, but they couldn’t be certain. Such a conclusion was unjustified because the amount held up in scrap was measured independently by the AEC in making the 1965 inventory. In addition, the burial pit was exhumed, the material found there was included in the final inventory and there were no other authorized waste disposal locations. Furthermore, if AEC believed more uranium was held up in different places than it had already identified,

then it could have made an estimate of how much, just as it did for the amount it estimated to have been tracked out of the plant on the shoes of workers. Apparently, the AEC commissioners and staff had a collective mindset that did not permit recognition of the real possibility that someone had stolen the missing uranium. It is also possible that there was collusion within the AEC to protect the diversion of uranium to Israel. As the years went by, the CIA collected new evidence that the uranium found its way to Israel, and the attorney general ordered an investigation of possible collusion in government agencies, as described in the following chapters.

The AEC said the monetary penalty it imposed on NUMEC represented the cost of material of various enrichments. Contemporary documents confirm that most of the missing HEU exceeded 90 percent enrichment. For example, the 1965 audits attributed the losses of HEU to the Astronuclear contract, which was 93 percent enriched.

Similarly, in a July 27, 1965 letter to Charles Keller at Oak Ridge, Shapiro said that analysis of air filters at Apollo showed “The vast majority of the filters in storage were accumulated during a period when the predominant quantity of uranium processed at the plant was enriched to greater than 90%... . As mentioned previously, we were processing predominantly higher enriched uranium in the period during which the 905 drums were buried.”¹⁸⁵ The fact that NUMEC began manufacturing 93 percent enriched uranium fuel for the Shippingport reactor in 1964 while it was processing HEU enriched to 97.7 percent for naval reactor fuel and 93 percent enriched uranium for the Astronuclear contract supports Shapiro’s statement that most of the uranium in the plant for the period in question was HEU.

On February 14, 1966, AEC’s general manager provided further confirmation of the HEU enrichment levels in the period of interest when he told the Joint Committee, “The quantity of 178 kg of U-235 represents enriched material ranging from slightly enriched to fully enriched at 93.15% U-235. Some SNM enriched greater than 93.15 has also been processed at NUMEC.”¹⁸⁶ The more highly enriched SNM to which he referred would have been naval reactor fuel.

In June 1967, the GAO (General Accounting Office) reported to the Joint Committee on its assessment of material control at Apollo. The report quoted an Oak Ridge document of 1964 saying “the percent of MUF [inventory difference] disclosed by comparing the adjusted book inventory to the physical inventory was 8.62% loss of uranium above 75% U-235, 3.19% loss of uranium below 75% U-235 and 6.01% loss of leased nuclear materials.”¹⁸⁷ That is, NUMEC was more than twice as capable in preserving U-235 in low enriched uranium than it was in preserving U-235 in highly enriched uranium.

The GAO also said, “During the period of our review, we found that additional losses had been disclosed and NUMEC’s records showed that cumulative losses of U-235 through December 31, 1966 totaled about 260 kilograms or about 1.2% of receipts.” GAO attributed its knowledge of the inventory in late 1966 to a letter from Zalman Shapiro commenting on a draft of the GAO report.¹⁸⁸

Thus, 82 kilograms of U-235 in the form of HEU was lost at Apollo in the 14 months between the time the AEC audit ended on October 31, 1965 (178 kilograms) and Shapiro's estimate for December 31, 1966 (260 kilograms). This was the highest rate of loss of HEU in the entire history of Apollo operations. Apparently this fact troubled no one at AEC or GAO, at least no one said so.

The losses at Apollo continued to accumulate. The AEC's records of inventory differences, as documented by ERDA, for companies that held strategic quantities of special nuclear materials showed that for the eight years from 1960 through March 1968, the inventory difference of HEU at Apollo was 267.1 kilograms. For reasons described above, most of this missing uranium would be of enrichment levels in excess of 90 percent.¹⁸⁹

In summary, the 1965 inventory by AEC included HEU of variable but generally high enrichments, including naval reactor fuel materials as high as 97.7 percent enriched. The 1967 GAO report and the 1977 ERDA report cited above confirm that the cumulative inventory difference for U-235 contained in HEU was 178 kilograms at the end of October 1965, grew to 260 kilograms by the end of December 1966 and was 267.1 kilograms by March 1968. That estimate of the total inventory difference was in close agreement with a 2001 Department of Energy report showing that the total inventory difference for U-235 in HEU at NUMEC from 1957 to 1968 was 269 kilograms.¹⁹⁰ These figures were all in the form of inventory difference, i.e., they combined losses that could be attributed and estimated, after the fact, to routine causes (such as measurement error or estimates in lieu of measurements of radioactive effluents and waste disposals) and losses that could not be attributed to routine causes (such as theft). It is likely that by 1968 the total amount of HEU that could not be attributed to routine causes exceeded the 93.8 kilograms estimated by AEC in 1965.

While the AEC was struggling with NUMEC to deal with the missing uranium, there were developments on a related front. On July 28, 1966, Secretary of State Dean Rusk sent a telegram to the U.S. Embassy in Israel concerning U.S. policy on Israel's nuclear program. Rusk said he told Israeli Ambassador Avraham Harman that the Soviets could get the Arabs to agree to denuclearization if Israel would agree to IAEA safeguards of its nuclear facilities such as Dimona. Israeli Envoy Gideon Rafael, who accompanied the Israeli Ambassador, replied to Rusk that Israel was not giving thought to that option because of the broader problem of conventional arms. Rusk responded that if Israel went nuclear it would lose U.S. support. "Secretary then told [the] Israelis that nothing would be more disastrous to GOI [Government of Israel] than [to] enter nuclear weapon field and urged them to agree to international safeguards... . He again noted that if Israel is holding open the nuclear option, it should forget U.S. support. We would not be with you, he said."¹⁹¹

On September 18, 1966, an article authored by John W. Finney, dateline Washington, DC, appeared in the Paris edition of the *New York Times*. Finney was the newspaper's lead correspondent on atomic energy matters. The article reported AEC's

discovery that one of its industrial contractors had lost more than 100 kilograms of enriched uranium, enough to make half a dozen atom bombs.¹⁹² This was the first public reporting of NUMEC's missing U-235. Finney did not name his source, but someone must have been concerned with the coverup then underway by the AEC, the FBI and the Joint Committee.

In later years, there were various reports in the media of the amount of uranium missing from Apollo by the end of 1965.¹⁹³ Those reports were based on what others recollected, not on the evidence summarized herein, that is, contemporary records of what AEC told Congress at the time and upon the underlying technical reports, such as the 1966 McDowell report, which supported the AEC's conclusions.

In addition, well after the fact, there were various accounts of the fines that NUMEC paid for the missing U-235 on the Astronuclear project.¹⁹⁴ The \$2.2 million figure described herein, of which \$764,000 was associated with uranium missing from the Astronuclear project, is based on records of what AEC told Congress at the time.

By the end of 1965, with the price of highly enriched uranium ranging from \$10 to \$15 per gram, about ten times the price of gold at that time, despite AEC's best efforts to find it, some 93.8 kilograms of U-235 in the form of HEU were missing from Apollo. No one, including the most qualified experts, could say for sure when or where it had gone. By 1968, even more HEU went missing from Apollo.

Because of NUMEC's loss of so much HEU at Apollo, the AEC concluded that economic incentives based on a presumption of honesty were not sufficient to protect bomb-making materials in the commercial sector. The commission directed its staff to develop new systems for accounting and securing strategic quantities of special nuclear material.

Soon after concluding its investigation at Apollo, the AEC formed an Advisory Panel on Safeguarding Special Nuclear Material, headed by Ralph F. Lumb, director of the Western New York Nuclear Research Center in Buffalo. The panel visited sites around the country that handled special nuclear material, including Apollo, and discussed safeguards with the people in charge, including Shapiro.¹⁹⁵ The panel recommended improvements of the safeguards provided for special nuclear materials, including physical security (fences, locks, vaults, guards, and other means to limit access to the material) and criteria for record keeping. The panel also recommended that AEC place resident inspectors at particular facilities, including Apollo.

In response, the AEC created an Office of Safeguards and Materials Management that reported to the commission and was responsible for safeguarding materials owned by the government and housed in government facilities. The AEC also established a Division of Nuclear Materials Safeguards reporting to the Director of Regulation. It was to administer the safeguards program for AEC licensees in the commercial sector and assist the Office of Safeguards and Materials Management in developing policies for both government and commercial facilities. The regulatory division developed guidelines for licensed facilities handling SNM, such as Apollo. The division also established a resident

inspector program at three fuel fabrication facilities (Apollo, Hematite, and Cimarron) and the spent fuel reprocessing plant in West Valley, New York. The AEC soon thereafter cut back the resident inspector program to West Valley due to staff shortages.¹⁹⁶ The safeguards programs required by these new offices and guidelines would, in the years to come, cost commercial and government facilities hundreds of millions of dollars per year.

With NUMEC's payment of the fine for the uranium lost on the Astronuclear project and with AEC's implementation of the changes recommended by the Lumb Panel, it would have been reasonable to conclude that the NUMEC affair was over. However, people in high places feared otherwise, including the National Security Council, the Justice Department, the FBI, the State Department and the CIA. What they knew and what they would learn about connections among Shapiro, the missing uranium and Israel's nuclear weapons program must have weighed heavily on their private thoughts. More than a decade would pass before their doubts about the missing uranium began to spill into the public domain.

¹¹ Yossi Melman covers intelligence and military affairs for the Israeli newspaper *Haaretz*; Dan Raviv is a *CBS News* correspondent. They have collaborated on articles and books on Israel's defense capabilities.

¹² No document has been found to confirm such a concern by the FBI. It is not clear why the FBI would care how the AEC Interview Team proceeded since FBI declined to do an investigation, as the Atomic Energy Act required, if criminal activity was suspected.

Chapter 5

Secret Investigation (1965)

In addition to its uneasiness with the discovery that NUMEC was missing nearly a hundred kilograms of U-235 in the form of HEU at Apollo, AEC was concerned with NUMEC's foreign entanglements. Four years earlier, on February 13, 1962, Lawton Geiger in AEC's Office of Naval Reactors was the first to express this concern when he wrote to Shapiro, "I consider the NUMEC relationship with the Societe d'Applications Industrielles de la Physique [a French undertaking] a matter of serious concern calling for increased security vigilance. The failure to comply with security regulations may be punishable as provided by law including the Atomic Energy Act of 1954 and by the espionage laws." According to a record note, Admiral Rickover suggested that Geiger's letter include reference to the governing laws.¹⁹⁷ Rickover was famous for paying close attention to the proprietary technology of the naval reactors program.

Two weeks after Geiger's rebuke, AEC's Director of Security Admiral J. A. Waters wrote to AEC's director of military applications complaining about lax security at NUMEC that was¹⁹⁸

attributable to lack of effort on the part of NUMEC management to establish and maintain an adequate and effective security program. Coupled with this is the information that NUMEC has the following known foreign affiliations. 1. An agreement for cooperation with Israel under which NUMEC serves as technical consultant and training and procurement agency for Israel in the U.S... . We have informed you about the aliens working in the Plutonium plant... . One of these, an Israeli metallurgist is a guest worker under the agreement [for cooperation].

In 1963, an AEC security official visited Shapiro to address the commission's concerns that foreign nationals working at NUMEC might violate security restrictions, for example, by gaining unescorted access to security areas or access to bomb quantities of plutonium or HEU. The security official noted that NUMEC had 502 employees, 176 with Q access authorizations [AEC's highest clearance for access to weapons materials and information], 326 with L access authorizations [AEC's second highest clearance], and a number of contracts and purchase orders involving documents, work and material classified through the level of Secret/Restricted Data. At the time of his visit, NUMEC had three uncleared foreign employees—one Dutch and two Argentines.

Shapiro told his AEC visitor about NUMEC's proposals to Euratom for two and possibly three more foreign nationals to work at the plutonium facility. He said NUMEC profited by its training of foreign workers because it "receives the benefit of their services without cost to the facility." Shapiro also reported NUMEC's agreement to assist construction of irradiation facilities in Israel for irradiating foodstuffs and producing drugs and medicines. In addition, he described NUMEC's agreement to serve as technical consultant and training procurement agency for Israel in the U.S. and its joint venture with the French in the electrical instrumentation and control business.¹⁹⁹ There is no mention in these records that Shapiro or the AEC personnel discussed the fact that the French were

well along in constructing Dimona.

In December 1963, Clement A. Palazzolo, chief of the research branch in AEC's division of security, informed FBI that AEC authorized NUMEC to fabricate four plutonium-beryllium neutron sources of five curies each to be used by the Department of Nuclear Science, Israeli Institute of Technology, located at Nahal Soreq. The shipment was made on an El Al Airlines flight to Israel on June 30, 1963. It weighed more than 270 kilograms.²⁰⁰ Such a shipment would have provided opportunity for addition or substitution of materials because of the lax security that was then in place for exports of SNM. Coincidentally, AEC's 1965 investigation of the uranium plant at Apollo showed that more HEU went missing from the plant in 1963 than any other year.

Although Shapiro's overseas affiliations made some people in the AEC nervous from the start, the commission did not alert the FBI to its concerns for several more years. In early 1965, NUMEC representatives told AEC inspectors at Apollo that Shapiro was negotiating with the Israeli AEC to establish a joint company in Israel. They said the company was "to be known as Israeli NUMEC Isotopes and Radiation Enterprises (ISORAD), Ltd." ISORAD's initial operation was to be the irradiation of citrus fruits using gamma rays emitted by cobalt 60 sources imported from America. The New York office of FBI also learned "NUMEC is a sales agent for the government of Israel through its Minister of Defense ... [and] has a contract with the Israeli AEC for the general development of plutonium oxide as fuel elements in nuclear reactors... . NUMEC has a contract with Chemical and Phosphates Limited [in Israel] for calcium zirconium production."²⁰¹ The records from these early days of AEC and FBI interaction concerning ISORAD contain no mention of the fact that Ernst David Bergmann, head of the Israeli AEC, was a leader in the Israeli nuclear weapons program.

News of this foreign ownership arrangement raised additional concerns at AEC because Shapiro and his employees held security clearances, were processing strategic quantities of SNM, and possessed classified information. The AEC's rules prohibited foreign ownership or control of companies having such responsibilities.²⁰² In addition, people who held AEC security clearances (most of the employees of NUMEC) were required to tell the commission of any changes in their foreign contacts and affiliations.

The AEC informed the FBI of NUMEC's interests in Israel and asked the Bureau to investigate Shapiro's activities, "to see if he has incurred obligations under the [Foreign Agents] Registration Act." On June 1, 1965, Hoover informed the Special Agent in Charge (SAC) of the Bureau's Pittsburgh Field Office of this information and tasked the Washington Field Office to, "check records of AEC, State, CIA for any pertinent information concerning subject and also check the Registration Section of the Department [of Justice] to determine if subject is a registered agent."²⁰³

According to the current website of the Department of Justice, the Foreign Agents Registration Act (FARA) was enacted in 1938.²⁰⁴

[The statute] requires persons acting as agents of foreign principals in a political or quasi-political capacity to make periodic public disclosure

of their relationship with the foreign principal, as well as activities, receipts and disbursements in support of those activities. Disclosure of the required information facilitates evaluation by the government and the American people of the statements and activities of such persons in light of their function as foreign agents. The FARA Registration Unit ... in the National Security Division (NSD) is responsible for the administration and enforcement of the Act.

The FBI first resurrected records of its previous background investigation of Shapiro in connection with his application for an AEC security clearance. Then the Bureau updated its knowledge of his activities and affiliations as of 1965. Excerpts from FBI files, interviews granted by Shapiro to third parties, and NUMEC filings with AEC lead to the following synopsis of Shapiro's background and affiliations.

Zalman Mordechai Shapiro was born in Canton, Ohio on May 12, 1920. He married and fathered three children. His parents' families came to America from Lithuania. His father and paternal grandfather were rabbis. He attended Johns Hopkins University where he received a B.A. in 1942, M.A. in 1945 and Ph.D. in 1948.

Before beginning his doctoral studies, Shapiro worked as a research associate for the National Defense Research Council where he studied chemical factors contributing to the erosion of high caliber guns. He was a chemistry instructor during his doctoral program. Westinghouse Electric Company hired him in 1948 as a Senior Engineer in its Research Laboratory in Pittsburgh. In 1949, the company transferred him to its Bettis Atomic Power Laboratory to support AEC's Office of Naval Reactors. At Bettis, he devised the first practical method for large-scale production of ultra-pure zirconium, the key ingredient in the cladding of fuel elements in most water-cooled nuclear reactors. Westinghouse awarded Shapiro its Order of Merit for Distinguished Service for his creativity with zirconium production.

Shapiro established facilities at Bettis for corrosion studies of metals in high-pressure water systems and directed research on the corrosion of Zircaloy, an alloy of zirconium. He participated in the design of the reactor for the first nuclear-powered submarine, *Nautilus*. In 1952, Bettis appointed Shapiro to be its manager of physical chemistry. From 1953 to 1955, he managed chemical metallurgy and developed fuel for the first U.S. power reactor, located at Shippingport, Pennsylvania. From 1955 to 1957, he served Bettis as manager of reactor design.

Shapiro authored Chapter V of the book *Metallurgy of Zirconium* (McGraw-Hill, 1955) and a large number of classified publications. By 1959, he had four patents concerning the production of pure metals and 17 other patent disclosures. His professional memberships included the American Chemical Society and the American Nuclear Society plus the academic honoraries Phi Beta Kappa and Sigma Xi. When he left Bettis in 1957 to form NUMEC, Shapiro was one of the leading metallurgists in the U.S. nuclear industry, if not the world.²⁰⁵

Soon after the FBI began its 1965 investigation of Shapiro, the CIA and the Justice Department informed Hoover that they had no "identifiable pertinent information

concerning the subject.” In addition, the Justice Department said it had no records concerning NUMEC and two of its senior officers, Oscar Gray and Jack Newman.²⁰⁶ Gray was a former State Department attorney and one of NUMEC’s founders. Newman was a former staff lawyer for the Joint Committee. Shapiro recruited Newman to take over Gray’s position as General Counsel of NUMEC. Newman left NUMEC after a few years to establish a law firm in Washington, DC that served AEC and then NRC licensees.

The FBI redacted much of the background information that it gathered on Shapiro in 1965 before it released the documents in the mid 1980s. It appears FBI made the redactions to protect Shapiro’s privacy. Since it is reasonable to expect that the Bureau learned of Shapiro’s extensive activities connected with Israel while doing its background checks, it follows that those activities are probably hidden by the redactions.

Shapiro, however, was open about those activities. Years later he listed them for an oral history compiled by the National Council of Jewish Women in the Pittsburgh area.²⁰⁷ Shapiro said he was an officer of the Technion Society, an American organization promoting education in science and technology in Israel through support of the Technion-Israel Institute of Technology. The Technion website lists him as an Honorary Life Member.²⁰⁸ He was a director for Hillel, a Foundation for Jewish Campus Life at more than 500 colleges and universities. He performed volunteer work for the Jewish Federation and the Anti-Defamation League. He was a life member of the Jewish National Fund and served as national vice president of the Zionist Organization of America (ZOA), the oldest and, at one time, one of the largest pro-Israel organizations in the United States. Jewish Americans founded ZOA in 1897 to support the establishment of a Jewish State in Palestine. ZOA helped to mobilize support for the creation of Israel in 1948. Shapiro has been active in ZOA for many years. On November 24, 2008, more than 500 people attended its National Dinner at the Grand Hyatt Hotel in New York City where they feted a number of people for contributions to the cause and honored board members Henry Schwartz and Zalman Shapiro for their contributions to the development of Israeli anti-missile technology.²⁰⁹

In 2011, the Internal Revenue Service revoked ZOA’s tax-exempt status for failing to file three consecutive years of key financial documents.²¹⁰ One of ZOA’s filings in the IRS case, which restored the organization’s tax-exempt status, was a 2012 listing of the members of its national board of directors, which included Zalman Shapiro.

In 2014, Israeli journalist Yossi Melman, writing in the *Jerusalem Post*, reported that Shapiro was on the board of governors of the Israeli Intelligence Heritage Center.²¹¹ The Center honors spies for Israel who secretly took action to advance the state. The names of seven of the nine recipients of its “Hero of Silence” award are secret. The latest award was given in 2009.²¹²

In October 1965, FBI agents in New York informed Hoover that a file in AEC’s New York office provided more details about NUMEC’s Israeli connections. The file contained a May 7, 1965 memorandum from the Research Branch of AEC’s division of security.²¹³ It read in part,

NUMEC is a sales agent for the Government of Israel through its Minister of Defense, Division of Supplies, [and] has a proposal pending with the Israeli government for the design, construction and operation of facilities for irradiation of foodstuffs in various parts of the world... . NUMEC has a contract with the Israel AEC for the development of plutonium oxide as fuel elements in nuclear reactors. NUMEC has a contract with Chemical and Phosphates Limited, Post Office Box 1428, Haifa, Israel, for calcium-zirconium production. [In addition] located in the Administration Building of NUMEC is the [office of] NUMEC Instruments and Controls Corporation (NUMINCO), a firm established to manufacture and market nuclear instruments and process control equipment. NUMINCO, according to this report, is owned by the Societe d'Applications Industrielles de la Physique, Paris, France, by NUMEC, and by a group of private investors, each having about a one-third interest.

On October 25, agents in FBI's Pittsburgh office reported additional background information on Shapiro and confirmed the information provided by the New York office.²¹⁴ On January 7, 1966, Hoover asked the Justice Department whether these various foreign connections would require Shapiro's registration as an Israeli agent under the provisions of the Foreign Agents Registration Act of 1938. Hoover wanted the Department's opinion before authorizing agents to interview Shapiro.²¹⁵

On February 14, 1966, the same day AEC staff briefed the commissioners on the status of their investigation of NUMEC's missing HEU, Chairman Seaborg wrote to Joint Committee Chairman Chet Holifield to answer questions raised earlier by the Committee. One of the questions asked whether an investigation of NUMEC by AEC's division of inspection or by FBI was warranted. Seaborg responded, "In the absence of evidence or suspicion of violation of law, we have determined that an inquiry by the FBI is not now warranted. Our Division of Inspection is presently reviewing the survey report and a determination has not been made as to the need for further inquiry by that Division."²¹⁶

Three days later, Howard Brown, AEC's assistant general manager, briefed FBI officials on AEC's findings regarding "sloppy management of nuclear materials by NUMEC." Brown told the FBI that the situation had been reported to the Joint Committee on February 14. Brown also said that the Committee asked searching questions regarding controls exercised by the AEC over nuclear materials, prompting it to "make more penetrating checks into NUMEC's operations, including interviews with some present and former employees." The FBI agents recorded Brown's other important points, as follows:²¹⁷

- An AEC inventory in November 1965 indicated a loss of 61 kilograms from the Astronuclear project with a value of \$764,000;
- The cumulative loss on all AEC subcontracts at NUMEC since 1957 was 178 kilograms;
- "While it cannot say unequivocally that theft or diversion of the 61 kilograms has taken place, AEC believes that NUMEC

consistently underestimated its processing losses;" and

- "It could not be determined when the various losses occurred or whether material provided for the latest subcontract was used, knowingly or inadvertently, to offset losses on other contracts."

The agents attending Brown's briefing indicated that FBI would not undertake an investigation of Shapiro based on what AEC had concluded about NUMEC's sloppy accounting being the reason for the missing HEU.²¹⁸ Two weeks after Brown's briefing, Hoover wrote to the AEC to confirm that FBI would not "assume any investigative responsibility" for the uranium missing from NUMEC.²¹⁹

On May 23, Justice advised FBI that information provided about Shapiro and his Israeli ventures "is insufficient to establish the requisite agency relationship required to bring the subject within the purview of the Foreign Agents Registration Act."²²⁰ Hoover was not satisfied with the answer, so a month later he authorized his Pittsburgh office to interview Shapiro "at the request of the Internal Security Division of the Department of Justice."²²¹

The internal security division had been pursuing Israeli intelligence operations against the U.S. since 1948.²²² John Davitt, longtime head of the division, told the *Washington Post* after his retirement that during his 30 years of federal service Israeli intelligence agencies were "more active in the U.S. than anyone but the KGB... . They were targeted on the United States about half the time and on Arab countries about half the time." Davitt also confirmed that there had been a handful of cases in the 1950s and 1960s in which Israeli diplomats suspected of espionage were asked to leave the country. The *Post* also cited a CIA report that Israel's intelligence priorities were the collection of information about U.S. policies detrimental to Israel and the collection of scientific intelligence in the U.S. and other developed countries.²²³ John Davitt figured in a Justice Department investigation of NUMEC in the 1970s.

The FBI's Pittsburgh Office interviewed Shapiro on June 15, 1966. After being advised of his rights to not make a statement and to consult with an attorney, and being told that anything he said could be used against him in a court of law, Shapiro "appeared to be extremely cooperative and friendly to Bureau Agents." He said that NUMEC "and the Israeli government" formed ISORAD about a year earlier following "lengthy negotiations." Each partner owned 50 percent of the company and each had four members on the board. Shapiro identified the members of the Board of Directors of ISORAD, including the chairman of the Israeli Atomic Energy Commission, Ernst David Bergmann. Neither he nor the FBI agents gave any indication in the interview that they knew of Bergmann's role in the Israeli nuclear weapons program.

Shapiro said that he and three others were the U.S. directors of ISORAD. The three others were also directors of NUMEC, namely, Leon Falk, Director of Duquesne Light Company, Benjamin Rosen, Pittsburgh attorney and realtor, and Phillip Powers, former president of Western Pennsylvania Power Company. Shapiro described meetings with the U.S. Ambassador to Israel and with Joseph Eyal, science attache of the Israeli embassy, in

connection with the formation of ISORAD. He said he made every effort to comply with the law in connection with his business in Israel, but he desired to immediately review the statutes concerning the Registration Act to determine if he or his company were violating the law in any manner whatsoever.²²⁴

On September 14, after reviewing the results of Shapiro's interview, the Justice Department advised Hoover that the actions of Shapiro and NUMEC did not constitute those of an "agent of a foreign principal" under the Registration Act.²²⁵ A month later FBI advised AEC of this decision.²²⁶ No record has been found to show whether Shapiro was informed of the outcome of the investigation.

A few weeks later, AEC told Hoover that the Joint Committee wanted to know if the Justice Department's decision applied to Shapiro's activities with respect to countries other than Israel, including France, Sweden, Italy, Japan, Canada, Australia, Belgium and Germany.²²⁷ Hoover told Justice there was no reason to believe that Shapiro was an agent of these other countries, as that term was defined in the Registration Act.²²⁸ Justice responded that it did not have enough information to make such a determination.²²⁹ Apparently, the matter was left there, thus ending this FBI investigation of Shapiro.

About the time Shapiro told AEC of his relationship with Bergmann in connection with ISORAD, Bergmann resigned from the Israeli AEC. The new Prime Minister Levi Eshkol forced him out as part of a deemphasis of nuclear weapons. After leaving IAEC, Bergmann enjoyed a brief appointment to the Institute for Advanced Studies in Princeton, arranged by Lewis Strauss, former chairman of the AEC. Strauss had met Bergmann at the Geneva Conference on Peaceful Uses of Atomic Energy in 1955.²³⁰ The director of the Princeton Institute found Bergmann to be very open about his work on the atom bomb. Furthermore, "it was a jolt to realize that Strauss—seemingly so ambivalent about his Jewishness and so opposed to any spread of nuclear weapons technology—privately was in favor of a nuclear-armed Israel."²³¹ There is no obvious reason to believe that Bergmann would have been any less open about his interest in the bomb in discussions with his business partner Shapiro than he was with the director of the Institute.

Chapter 6

Ambiguous Membership (1967)

In April 1967, Atlantic Richfield Corporation (ARCO) surprised the nuclear industry by purchasing NUMEC. ARCO was a large petroleum company that formed a year earlier through the merger of Atlantic Refining and Richfield Petroleum. Although ARCO's prior business strategy was simple—sell as much low-priced gasoline as possible—its purchase of NUMEC apparently signaled an effort to diversify its energy mix to include nuclear power. Shapiro stayed on as president of the NUMEC subsidiary of ARCO.

The purchase of NUMEC was not ARCO's only venture into the nuclear field. By September 1967, ARCO formed another subsidiary, Atlantic Richfield Hanford Company, and took over operations of a portion of AEC's Hanford Site in Washington State. ARCO's scope of work included chemical processing operations (plutonium separation from spent reactor fuel). These initiatives did not go well for ARCO. Within a decade it was out of the nuclear business altogether.

In a proxy statement in 1966, just before the ARCO buyout, NUMEC stated that its net worth and working capital “were reduced below the levels required in various agreements with lenders, and a condition of technical default arose.” The company said it had no alternative but to arrange for a merger.²³²

The *Pittsburgh Post-Gazette* covered the April 14, 1967 meeting of NUMEC shareholders where the sale to ARCO was approved. ARCO agreed to convert each share of NUMEC stock to 0.255 share of ARCO stock, making NUMEC stock worth \$23.05 on the day of the sale.¹³ There were 322,000 shares of NUMEC outstanding at the time, indicating that ARCO paid \$7.4 million to NUMEC's shareholders. ARCO also assumed NUMEC's debts amounting to another \$6.3 million. Thus, ARCO paid nearly \$14 million. Shapiro said NUMEC's backlog at the time was \$7 million. Thirty shareholders showed up for the meeting, which “was punctuated by some bitter comments over the fact that a \$2 million loss on a federal government contract broke the back of the 10-year-old local firm... . Dr. Shapiro said the loss contract involved production of new nuclear fuel for the Shippingport power plant.”²³³ If Shapiro mentioned the Astronuclear contract, the reporter missed it.

In later years, people talked as if Shapiro made a lot of money when ARCO bought NUMEC. He did make some money but not as much as some people would have thought. Shapiro owned only about six percent of NUMEC's stock at the time of the ARCO purchase, meaning he made about \$450,000 pre-tax.²³⁴ An FBI document said that in March 1969, while presiding over NUMEC as an ARCO employee, Shapiro's annual salary was \$50,000.²³⁵

Grant Smith cast a more disquieting light on ARCO's purchase of NUMEC. His research suggests that ARCO was given special consideration by the AEC in awarding the contract for operating the 200 Area at the Hanford reservation of the AEC over firms that were more qualified (including the incumbent contractor) because ARCO had purchased NUMEC. Smith noted that AEC announced the competitive procurement for the Hanford

contract on February 27, 1967, a month or so before the sale of NUMEC to ARCO. He then cited records to show that the AEC commissioners were involved in reviewing the bids that were received in May 1967 for the Hanford contract. Direct involvement of the commissioners in the selection of the winner in a competitive contract was unusual for the AEC. Moreover, in minutes of its discussions leading to the award of the Hanford contract in July 1967, it is clear that the commission considered ARCO's April 1967 purchase of NUMEC. Adding weight to Smith's argument that something was amiss, AEC's announcement of ARCO's selection for the Hanford contract mentioned a subsidiary non-nuclear operation of NUMEC, not the facilities in Apollo and Parks Township, as the basis for the selection. The AEC said, "The technical ability of Atlantic Richfield is considered outstanding and satisfies the requirements of the contract." But for its recent acquisition of NUMEC, ARCO had no technical ability in nuclear technology. The AEC paid ARCO \$30.4 M in the first year of the cost-plus fixed fee contract to operate the 200 Area at Hanford.²³⁶

In May 1967, Egypt expelled the UN emergency force in the Sinai Peninsula that had served as a buffer with Israel since the Suez Canal Crisis. Then Egypt brought nearly 1000 tanks and 100,000 soldiers to its border with Israel, boycotted all ships flying the Israeli flag, and called for unified Arab action against Israel. Before the other Arab states could muster, on June 5, 1967, Israel attacked and quickly defeated Egypt's air force and gained early superiority over the Egyptian army in the Sinai. The Israeli forces then wheeled to meet attacks by Jordan and Syria from the west. Six days later, at the war's end, Israel had defeated all three of its Arab attackers and won a convincing victory that expanded its occupied lands several fold by gaining control of the Sinai Peninsula, the Gaza Strip, the Golan Heights and the West Bank.

U.S. Ambassador to Israel, Walworth Barbour, surmised that the Israelis had a rudimentary, perhaps unassembled, nuclear weapon on the eve of that Six-Day War.²³⁷ He based his conclusion on reports from people who worked in the embassy and followed developments at Dimona, including CIA's station chief, John Hadden.²³⁸

The CIA also concluded that Israel had a bomb by 1967 based on information supplied by Edward Teller about Dimona. Teller made six visits to Israel between 1964 and 1967. His first visit was at the invitation of physicist Yuval Ne'eman. Teller met Ne'eman in 1964 when Ne'eman was a visiting professor in theoretical physics at Berkeley. During his visits to Israel, Teller met with Israeli nuclear scientists and his sister. He gave a series of ten lectures at Tel Aviv University where Ne'eman was vice president. Teller also met with military leader Moshe Dyan and Prime Ministers Ben-Gurion, Eshkol and Meir.²³⁹

In 1967, shortly after the Six-Day War, Teller told Ne'eman "I think that you are not idiots, and I am impressed by your high level, and I think that you have already finished, and the thing is now behind you. I do not think that the cat and mouse game with the Americans is healthy, and it will cause problems in the future, so I am going to tell the CIA of my impressions, and I'll explain that it is justified on the background of the Six-Day War." Teller spent the next year persuading Duckett at CIA that Israel had attained a

nuclear weapons capability.²⁴⁰

If Israel had a rudimentary atomic bomb in 1967, it could have been fueled by either plutonium or highly enriched uranium. Sufficient plutonium might have come from the first reprocessing operations at Dimona, while HEU had to come from outside the country because Israel did not have a uranium enrichment capability at that time. The general characteristics of the bombs dropped on Hiroshima and Nagasaki show what Israel's first weapons might have looked like.

The bomb dropped on Hiroshima was fueled by highly enriched uranium. Bearing the nickname "Little Boy," it was ten feet long, twenty-eight inches in diameter and weighed about 4,000 kilograms. It was of the so-called gun-assembled design that used two charges of chemical explosives to drive two subcritical masses of HEU towards one another, down a gun-barrel-like cylinder, jamming them together in a total mass that became rapidly super critical and promptly detonated. Little Boy had the destructive energy of fifteen thousand tons of high explosive. The Japanese correctly interpreted the data from Hiroshima to indicate that the bomb had been fueled by uranium and that the U.S. probably did not have a backup uranium device because of the lead-time required for enrichment. Three days later the Japanese were astounded when a plutonium-fueled bomb was dropped on Nagasaki. Since the U.S. could be churning out plutonium at a high rate, the Japanese judged that there were or soon would be many backups to the Nagasaki weapon. They surrendered within a week.²⁴¹

The Nagasaki bomb was fueled by plutonium-239, a more efficient fuel than HEU because less Pu-239 is needed for a critical mass and, if the weapon is of an implosion design, more explosive yield results from a particular mass. Bearing the nickname "Fat Man," the Nagasaki bomb was ten feet eight inches long, five feet in diameter, and weighed 4,500 kilograms. It was an implosion weapon wherein a subcritical sphere of plutonium weighing less than 10 kilograms was surrounded by high explosives. Symmetrical, simultaneous detonation of the high explosives forced the sphere to collapse and form a super critical mass, resulting in superheated plasma producing a nuclear explosion. Fat Man had the destructive energy of twenty-one thousand tons of high explosive.²⁴² Later research decreased the size of such bombs.

It is unclear whether the Israelis could have fabricated a plutonium bomb by 1967. Historians, diplomats, inspectors, scientists and journalists have said a range of things on the subject. Hersh said the Israelis completed construction of the reprocessing plant at Dimona in 1965.²⁴³ The AEC's inspectors of Dimona in 1961 did not learn of the reprocessing facility and opined that the reactor would not be operational until 1964. Seaborg said he knew with "near certainty" that the Israelis had a secret reprocessing facility to extract plutonium from Dimona's spent fuel when he visited Israel in 1966.²⁴⁴ The science attache at the U.S. embassy in Israel concluded in a 1965 study that the reprocessing plant to extract plutonium from uranium irradiated at Dimona could be put into operation by 1967 and a bomb fueled by plutonium could be assembled and tested by 1968.²⁴⁵ The U.S. Army said that the first plutonium extraction took place at Dimona

during the second half of 1965 and that Israel had enough plutonium to manufacture an atom bomb during 1966 or early 1967, at the latest.²⁴⁶

Hersh said the Israelis conducted a low-yield nuclear test in the mid 1960s.²⁴⁷ Cohen surmised that it was a hydronuclear test conducted underground on November 2, 1966.²⁴⁸ Reed and Stillman said that the 1966 test was a hydrodynamic test to confirm detonation, implosion and initiation aspects of Israel's first atomic bomb design.²⁴⁹ Hydrodynamic tests use high explosives to compress subcritical quantities of plutonium or uranium metal into superheated plasma. The tests typically occur inside rugged containment structures for safety purposes and are highly instrumented to provide information about the metallurgy and thermal-hydraulics of the material being tested. The explosion in a hydrodynamic test lasts only a fraction of a millisecond. Test ban treaties between the U.S. and Russia require that such tests produce zero atomic yield, i.e., no nuclear fissions.

If Israel fueled its 1966 hydrodynamic test with plutonium, then the reprocessing plant at Dimona had made rapid progress between startup in 1965 (two years ahead of when the U.S. embassy said it was possible) and the production of significant quantities of plutonium.

Cohen later found additional information that sheds light on the status of Israel's atom bomb in the days leading to the Six-Day War.²⁵⁰

Some bits and pieces of additional historical information have emerged in recent years that permit a more comprehensive and daring reconstruction of the nuclear aspect of the 1967 war, at least on the Israeli side. This new evidence indicates that prior to that war, Israeli leaders were still unsure about their ultimate goals for the program and deeply concerned about world reaction if they were to move forward. The May 1967 crisis, however, also was a critical turning point in Israel's nuclear history. It was then, in a crash and improvised initiative, that Israel assembled nuclear devices to be ready for the unthinkable... . In the year prior to the 1967 war, Israel was moving fast toward wrapping up separate research and development efforts on fissile material production and weapons design and nearing a complete nuclear option. This convergence brought the Israeli nuclear project to a major junction that required a new set of political decisions... . Israel was in a position to conduct a full-yield nuclear test in the second half of 1966, had its leaders so chosen. Had Israel conducted a test that year, even a so-called peaceful nuclear explosion, it could have declared itself the world's sixth nuclear state, and subsequently, it could have joined the nuclear Nonproliferation Treaty (NPT) as a declared nuclear-weapon state... . In December 1966, a major industrial accident occurred in one of the "hottest" areas in the Dimona complex. An employee was killed, and a sensitive working area was contaminated. It took weeks of cleanup to decontaminate the area. The accident left Israel's nuclear chiefs shaken, including Eshkol. Three months later, in a cable to Washington, U.S. Ambassador Walworth

Barbour reported that he never saw Eshkol so uncertain about the future of the nuclear project, suggesting that it was time for innovative diplomacy on the nuclear issue. In correspondence in March 1967, Barbour dismissed U.S. intelligence reports that asserted Israel was only weeks from the bomb and noted that Dimona was “not running at full blast.” ... Then came the crisis of May 1967, which dramatically changed the nuclear situation in the Middle East. As the likelihood of war intensified ... Israel did something it never had done previously. Israeli teams assembled virtually all the components, including the handful of nuclear cores it had, into improvised but operational explosive devices. Preliminary contingency plans were even drawn up for how such improvised devices could be used in a manner that would demonstrate nuclear capability short of a military use. An unpopulated site was even chosen. The idea behind it was highly indicative of Israel’s anxious state of mind in those days of May and June 1967. If all else failed and Israel’s national existence would be in peril, the state would still have its doomsday capability.

If Cohen was correct, Israel had enough fissile material “to conduct a full-yield nuclear test in the second half of 1966” and to assemble “virtually all the components, including the handful of nuclear cores it had, into improvised but operational explosive devices” by May 1967. Cohen maintains that the devices were plutonium fueled.²⁵¹

If plutonium had been available in 1966, and if the Dimona reprocessing facility began operating in the second half of 1965, then Israel equaled or bettered the ten months that elapsed between America’s first production of plutonium at Hanford and the Trinity test of the world’s first atom bomb, which was fueled by plutonium. In addition, Israel accomplished the feat despite “a major industrial accident ... that took weeks to clean up.”²⁵² That would have been a significant accomplishment by the Israelis in view of the relative sizes of the Manhattan Project (large) and the Dimona Project (much smaller). If the “improvised devices” used plutonium fuel, then most likely they were implosion weapons and Israel would have had to develop precision machining technology for both plutonium and high explosives in that same time. In addition, if Israel conducted a hydrodynamic experiment with plutonium in 1966 and had enough plutonium left over to field one or more weapons in the second half of 1966 (Cohen implies more than one), then Dimona’s production equaled or bettered the production of plutonium by the Manhattan Project (one bomb for Trinity, one bomb for Nagasaki and one spare).

If the “improvised devices” were gun-assembled weapons fueled with HEU, the technology requirements were not as great. It would have been a much easier task to fabricate several gun-assembled atom bombs before the Six-Day War using HEU diverted from NUMEC. That approach would not have required the precision machining of explosives and pits required of implosion devices using plutonium.

James Coates of the *Chicago Tribune* recounted events differently.²⁵³ He said that at the time of the Six-Day War, CIA analysts concluded,

Israel had been working on a weapons plan based on making bomb fuel at the nation’s Dimona reactor. However, the Israelis decided it would

be several years before the reactor produced bomb grade material. Fearing that Israel's Arab adversaries would destroy the reactor before a bomb was produced, Israeli officials attempted to obtain a bomb elsewhere.

Henry Myers, former staff member of the NRC oversight committee in the House of Representatives (chaired by Morris K. Udall, D-AZ), came to a similar conclusion in 2007 when he reviewed Cohen's new information.²⁵⁴

Cohen did not say whether the weapons' core material was plutonium or highly enriched uranium ... but he includes at least one suggestion that it might not have come from the Dimona plutonium-production complex. Cohen mentions March 1967 correspondence in which U.S. Ambassador to Israel Walworth Barbour "dismissed U.S. intelligence reports that asserted Israel was only weeks from the bomb," presumably basing his assessment on progress at Dimona, which U.S. intelligence agencies were believed to be monitoring closely. If Dimona had not produced sufficient plutonium before the 1967 war for a "handful" of weapons, where did the fissile material in Israel's first weapons come from? ... Israel had the motive, the opportunity, and the capability to obtain HEU from NUMEC.

This reasoning applies if the Israelis used the Apollo HEU for bombs. However, there is also the possibility that the Israelis used the HEU from Apollo to improve the performance of Dimona.

¹³ In 1978, Shapiro told Congressman Udall the amount was \$135 per share.

Chapter 7

Desert near Dimona (1968)

In January 1968, President Johnson entertained Prime Minister Eshkol at his Texas ranch. The president was vigorous as usual in reiterating America's unconditional commitment to Israel's security. In preparation for the conversation with Eshkol, the State Department told Johnson "We are reasonably, though not entirely, confident that Israel has not embarked upon a program to produce a nuclear weapon."²⁵⁵ The State Department apparently discounted Ambassador Barbour's information of a year earlier and was not privy to the information that Edward Teller had been pressing on Carl Duckett at CIA for the past year, i.e., Israel already had the bomb. And no one knew what CIA was about to find in the desert near Dimona.

In the late 1960s, at CIA's request, American embassy personnel in Israel stepped up their surveillance of Dimona in an attempt to detect when it first began to produce plutonium. The Americans collected environmental samples near the site for analysis in a radiochemistry laboratory. Such a lab can discern the relative abundance of various radionuclides in environmental samples. Scientists then can deduce the characteristics of the operations being conducted inside the facility that released the radioactivity in its effluents.

Hersh told it this way, "In an attempt to determine whether the chemical reprocessing plant was in operation, the CIA began urging attaches to pick up grass and shrubs for later analysis."²⁵⁶ As a senior DOE scientist told Fialka, the embassy personnel were "walking through the daisies," collecting dust on their shoes.²⁵⁷ The CIA was looking for traces of fission products, including plutonium, which would appear in the environment as soon as the reprocessing facility began to operate.

John Hadden, CIA's station chief in Tel Aviv, told Raviv and Melman about his efforts to collect radioactive samples near Dimona. "He would make a point in driving as close as he could to the nuclear reactor and occasionally stopped his car to collect soil samples for radioactive analysis. Shin Bet was obviously tailing him, and an Israeli helicopter once landed near his automobile to stop it. Security personnel demanded to see identification, and after flashing his U.S. diplomatic passport Hadden drove off, with little doubt there were big doings at Dimona."²⁵⁸ John Hadden, Jr. recalled a time in 1965 when his father took the family on a picnic in the Negev desert where the dome of the Dimona plant could be seen. While he and his siblings ate peanut butter sandwiches, John, Jr., aged 12, watched his father clip branches from the shrubbery and put them in the trunk of their car.²⁵⁹

There are no public reports of whether CIA ever found plutonium near Dimona in 1968. However, there are various reports that in early 1968 CIA was surprised to find traces of HEU in the environment near Dimona. Since there were no uranium enrichment facilities in Israel at the time, the HEU in the environmental samples had to come from outside the country.

Furthermore, radiochemical analysis of the environmental samples enabled CIA to

identify the source of the uranium because the relative abundance of uranium isotopes in such a sample can be a telltale of where the uranium was enriched. All accounts of the discovery of HEU near Dimona said that the isotopic “signature” proved that some of the HEU was enriched at the AEC plant in Portsmouth, Ohio.²⁶⁰ Such a signature would have been readily associated with the Portsmouth plant because it was the only source of 97.7 percent enriched uranium anywhere in the world.²⁶¹

If CIA discovered such very highly enriched uranium near Dimona, thus indicating that it came from Portsmouth, the discovery also confirmed that at least some of the HEU diverted from Apollo came from naval fuel contracts, not just the 93 percent U-235 in the HEU in the Astronuclear contract. Since there was only one HEU scrap recovery line at Apollo, and since HEU had been disappearing from Apollo for several years, such a constellation of facts is technically feasible.

On April 11, 1968, CIA issued National Intelligence Estimate 35-68 addressing Israel’s security situation in the aftermath of the June 1967 Six-Day War. Redactions account for a little more than one page in the copy that CIA released to the public. In discussing Israel’s military policy the Estimate says,

Israel will maintain a military superiority over the Arabs, with a view to deterring them or, if war comes, defeating them quickly enough to prevent serious damage to itself. This means modern weapons... . The Israelis see a need not only to be militarily stronger than the Arabs, but to be able to defeat them quickly and without suffering much damage in return. The Israelis are convinced that if their own armed forces were badly defeated or if their small country suffered serious physical damage, it would mean the end of Israel as a state. Hence, they are determined to stay well ahead of their Arab neighbors in modern weapons... . But in some types of advanced weapons, Israel has the know-how and the resources to supply itself, if need be... . In 1962 Israel made an agreement with the French firm of Marcel Dassault for the design, building and testing of the MD-620, a missile with a payload of 3,000 pounds and a range of about 280 nautical miles... . If they propose to use a high-explosive or chemical warfare warhead, they will presumably see a need for many more missiles than if a nuclear explosive were used. It may well be that Israel will decide to have some warheads of each type.

The location and concentration of redactions in the report and the absence of any other discussion of nuclear matters suggest that the redactions addressed CIA’s conclusion that Israel had nuclear weapons either assembled or ready to be assembled at the time of the Six-Day War. The redactions might have included information about CIA’s discovery of HEU near Dimona. It is also possible that another National Intelligence Estimate with such conclusions was issued as early as January 1968.²⁶²

Carl Duckett, by then the CIA’s Deputy Director for Science and Technology, told NRC investigators that a 1968 National Intelligence Estimate concluded, “that the Israelis

had nuclear weapons.”²⁶³ Duckett went on to say,

He showed it to Mr. Helms. Helms told him not to publish it and he would take it up with President Johnson. Mr. Helms later related [to Duckett] that he had spoken to the President [Johnson], that the President was concerned, and that he had said, “Don’t tell anyone else, even Dean Rusk [Secretary of State] and Robert McNamara [Secretary of Defense].”

Beginning in March 1968, there was lively correspondence at high levels within the FBI concerning a “Possible Atomic Energy Act Violation” and Dr. Zalman Mordecai Shapiro.²⁶⁴ The documents were highly redacted when released by the FBI, but they referred back to an AEC physical inventory of Apollo in 1965 resulting in “a quantity of U-235 [that] was unaccounted for.”²⁶⁵

On April 2, 1968, Richard Helms wrote to Attorney General Ramsey Clark to ask FBI to reopen its investigation of Shapiro. The cover note for the letter from Helms to Clark has been released in unredacted form and says, “Since the subject matter of this letter is so sensitive for obvious reasons, I would appreciate if you would return it to me when you have taken whatever action you feel appropriate.” In the recently declassified copy of the letter, immediately following a twelve-line redaction, Helms asked Clark to initiate an investigation.¹⁴

You are well aware of the great concern which exists at the highest levels of this government with regard to the proliferation of nuclear weapons... . It is critical for us to establish whether or not the Israelis now have the capability of fabricating nuclear weapons which might be deployed in the Near East... . Given the aforementioned circumstances, I urge that the Federal Bureau of Investigation be called upon to initiate a discreet intelligence investigation of an all source nature of Dr. Shapiro in order to establish the nature and extent of his relationship with the Government of Israel.

It is clear from the frequency and content of subsequent internal FBI memoranda that the Bureau reopened its investigation of Shapiro at that time. It is likely that the redacted portion of the letter told Clark of CIA’s discovery in the environment near Dimona of traces of HEU enriched by the AEC at Portsmouth, Ohio.²⁶⁶

In September 2015, as a result of an FOIA lawsuit brought by Grant F. Smith, CIA released a summary of documents it sent to the JCAE in April 1976.²⁶⁷ One of the documents was an April 1, 1968 covering memorandum for the April 2, 1968 DCI letter to Attorney General Clark. The covering memorandum reports that

DCI letter cleared with Brown (AEC) and incorporates Brown’s suggestion. Brown’s reaction was that purpose of letter correct and last two paragraphs acceptable; he believed, however, it contained an [line redacted] but declined to revise that portion. DDO [name redacted] belief is that Brown wants to avoid responsibility for letter but cannot

disapprove it.

It is likely that the purpose of Brown's review was to confirm the conclusions that CIA was drawing about the importance and nature of the uranium or other evidence it had found in Israel. In Smith's lawsuit, the CIA recently has argued that some of its documents about NUMEC contain Restricted Data as that term is defined in the Atomic Energy Act, i.e., information about nuclear weapons. The line that was redacted by CIA in the aforementioned Brown correspondence could have been such Restricted Data.

On May 6, 1968, FBI Deputy Director DeLoach wrote to FBI Associate Director Clyde Tolson concerning the new investigation of Shapiro that CIA had requested.²⁶⁸ DeLoach expressed misgivings about the investigation. "The fact that the said disappearances have occurred over a period of several years would certainly make investigation a questionable item if, in fact, there has been no report of such matters to us previously." Director Hoover penned his approval of the new investigation with his scrawl and initials at the bottom of the two-page memo, "OK, but I doubt advisability of getting into this [redacted]."

It is likely that the new investigation included a concern with Shapiro's foreign travel because on May 20 FBI was seeking "a live source who will be familiar with the subject's travel arrangements."²⁶⁹

On May 24, a 13-page memorandum circulated within the Bureau concerning "Dr. Zalman Mordecai Shapiro, Internal Security – Israel, Atomic Energy Act."²⁷⁰ The cover memo, including the names of the originator, the recipient and the receivers of carbon copies (except "Liaison"), and all 13 pages of the attachment were redacted when released by FBI in 2009 pursuant to my FOIA request. All that remains in the document comes under the heading of Action, "The above information and enclosure are being directed to the attention of the Nationalities Intelligence Section." Within the FBI Intelligence Division, a Counterintelligence Branch supervised investigations and other operations directed against hostile foreign intelligence services and espionage activities. The Counterintelligence Branch included an Espionage Section, a Liaison Section and a Nationalities Section.²⁷¹ Apparently, FBI considered Shapiro's alleged activities to be inimical to the interests of the United States. The fact that nearly everything in the 13-page document is redacted indicates that it dealt with information supplied by the CIA.

The voluminous correspondence in 1968 within FBI, between FBI and Justice, and between unidentified persons and organizations concerning the second investigation of Shapiro did not mention CIA. However, some of the correspondence in this period, like the memo of May 24, is so highly redacted that it is impossible to determine the subject of the correspondence, other than it related to Shapiro, or the identity and affiliation of the correspondents. It is likely that such highly redacted correspondence was between FBI and CIA, especially when the words "Liaison Officer" were included and not redacted in the cover letters.

In mid 1968, the CIA informed AEC that it had "received reports that the Israelis had somehow obtained a supply of enriched uranium."²⁷² Seaborg reasoned,

Although Israel was known to be capable of producing plutonium at a

French-supplied test reactor at Dimona in the Negev desert, it was not believed capable of producing U-235, and Israel's reported possession of a supply of that material directed attention once more toward NUMEC. Because the CIA is enjoined by law from conducting domestic investigations, the agency called on the FBI for assistance.

Meanwhile, NUMEC's losses at Apollo continued to grow. On June 17, 1968, a NUMEC employee and former AEC staffer, James Lovett, compiled a handwritten summary of the uranium inventory at Apollo on a cumulative basis. He prepared it for a phone conversation with General Delmar Crowson, Director of AEC's Office of Safeguards and Materials Management, regarding an article in the *Wall Street Journal*.²⁷³ Lovett's inventory showed that NUMEC had processed 13,471 kilograms of U-235 in the form of HEU from plant startup through May 31, 1968 and had a cumulative inventory difference associated with that material of 287 kilograms of U-235, i.e., 2.1 percent. NUMEC was continuing to lose HEU at a far higher rate than the rest of the industry.

The Bureau used warrantless wiretaps in its renewed investigation of Shapiro. Several FBI memoranda referred to the fact that "no grand jury subpoena is being used in this instance in view of the sensitive nature of this investigation."²⁷⁴ The wiretap authority was updated from time to time.²⁷⁵ At that time, warrantless wiretaps on U.S. citizens were legal so long as they involved national security concerns. Until 1972, the Bureau used warrantless wiretaps and bugs against American citizens and foreigners within the United States to collect intelligence and counterintelligence information, to monitor subversive and violent activity and to determine the sources of leaks of classified information.

The CIA and the National Security Agency (NSA) also have used electronic surveillance techniques for intelligence purposes. The CIA's Office of Security recorded fifty-seven individuals that were targeted by telephone wiretaps or microphones in the U.S. between 1947 and 1968. In the aftermath of the terrorist attacks on the U.S. in September 2001, the NSA now eavesdrops electronically on the entire U.S. population.²⁷⁶

By the time of its NUMEC investigations, FBI had been using warrantless wiretaps for many years based on a 1939 directive from President Franklin Roosevelt empowering the Bureau to deal with foreign interests "clearly and directly." Even though all the presidents and attorneys general after Roosevelt allowed Hoover to conduct warrantless surveillance of suspected spies, including wiretapping, the information that was gained wasn't used in court because the Bureau and the Justice Department feared the courts would find the practice to be unconstitutional.²⁷⁷ Despite the fact that warrantless wiretaps had become less popular by the mid 1960s because of concerns about their legality, on July 5, 1968 Attorney General Ramsey Clark specifically authorized wiretapping of Shapiro during the second FBI investigation of the alleged diversion of HEU to Israel.²⁷⁸ Although the FBI used the wiretap information to guide its investigation, the warrantless nature of the information predetermined its inadmissibility in court.

A June 13, 1968 report from FBI's Pittsburgh office noted the current makeup of the NUMEC Board of Directors.²⁷⁹ The directors included all of those from 1965, namely, Falk, Fondiller, Forscher, Gray, Pepkowitz, Powers, Rosen and Shapiro, plus one newly identified director Charles N. Berents, vice president in charge of investment, J. H. Hillman and Sons, Pittsburgh. Thus, for at least a year after ARCO bought NUMEC in 1967, Shapiro continued as NUMEC's president, and the company's board of directors remained essentially unchanged.

Later in June, FBI's Washington Field Office provided Hoover with AEC's April 1966 report of interviews with former and present employees of NUMEC, some financial information and a list of transfers of SNM made by NUMEC to various foreign entities.²⁸⁰ The FBI agent that prepared the transmittal memo told Hoover that the AEC had "an unusual interest in the reason for the Bureau's current interest" in NUMEC. He went on to say, "the matter of that alleged diversion is not a primary target at this stage of instant investigation." This last statement is at odds with the facts of the matter, i.e., CIA requested the new FBI investigation because it found traces of HEU near Dimona and surmised that the uranium had been diverted from Apollo. If the Washington Office of FBI did not know that the possibility of such a diversion was driving its investigation, then compartmentalization of intelligence information may have prevented FBI agents in the field from knowing CIA's intelligence information about Dimona, another casualty of the conflicting interests of FBI and CIA.

The NSA provided further evidence in 1968 that Israel had developed nuclear weapons. Its electronic eavesdropping revealed that the Israeli Air Force had practiced bombing runs typical of those used for delivery of nuclear weapons, i.e., bombing runs designed to get the planes away fast before their pilots were exposed to lethal radiation. The Israelis conducted the practice runs in aircraft purchased from the United States in one of several arms deals that President Johnson approved. That deal was made in 1966 and involved forty-eight A-4E Skyhawk tactical fighters. Despite protests from the State Department, the Skyhawks were equipped with the capability to deliver atom bombs.²⁸¹

Late in 1968, in the waning days of the Johnson administration, Israel and the U.S. concluded some long-enduring negotiations over conventional arms. Secretary of State Clark Clifford, who succeeded Robert McNamara in March, and Assistant Secretary of Defense for International Security Affairs Paul Warnke vehemently urged that the conventional arms should only be conveyed if Israel agreed to sign the NPT. As the lead U.S. negotiator, Warnke stunned Israeli Ambassador Yitzhak Rabin by the frankness of his demands for the quid pro quo. In his memoirs, Rabin recalled,²⁸²

Warnke ... took off his silken gloves and the claws that he bared transfixed me to my chair, and made my blood boil. As a condition for the supply of the Phantoms, the United States was demanding that Israel sign a shocking document, the likes of which no sovereign nation had ever been asked to sign.

In the end, Rabin outmaneuvered Warnke and Clifford by enlisting Abe Feinberg and Arthur Goldberg to speak with Johnson on Israel's behalf. In the end, Johnson sided

with the Israelis. In a telephone call in late 1968, he told Clifford, “Sell them anything they want.” When Clifford replied that he did not want to live in a world where Israel had nuclear weapons, Johnson replied “Don’t bother me with this anymore” and hung up. Thus, from 1965 to 1968 Johnson consistently delivered the same message to McCone, Helms and Clifford: He did not want to discuss the matter of Israel’s acquisition of nuclear weapons. Instead, he was ready to welcome Israel to the nuclear club. As nonproliferation author George Perkovich put it, “Defense Secretary Clark Clifford and Secretary of State Dean Rusk did not know that Israel already had the bomb and that Feinberg and Goldberg already had the president.”²⁸³

Warnke opined years later “Both Kennedy and Johnson waxed eloquent about the dangers of an increase in the nuclear club, but key officials appear to have been either indifferent or ready to accept an Israeli bomb.”²⁸⁴

In June 1968, after years of negotiations, the United Nations General Assembly endorsed the Treaty on the Nonproliferation of Nuclear Weapons, commonly called the NPT or Nonproliferation Treaty. On July 1, the United States, Great Britain, the Soviet Union and 59 other countries signed the treaty. China and France did not sign but implied they would do so after they acquired their own nuclear weapons.

Under the NPT, which became effective on March 5, 1970, the IAEA, a subsidiary agency of the United Nations, provides a safeguards system to ensure that non-weapons states that are party to the treaty use fissionable materials and associated technology only for peaceful purposes and not in the construction of weapons. In addition, all parties to the treaty, both those with nuclear weapons and those without, agreed to pursue negotiations in good faith to cease the nuclear arms race and pursue nuclear disarmament. By 2008, 187 nations were party to the NPT. In 2002, Cuba was one of the last to sign, and in 2003, North Korea reneged on its earlier signature.²⁸⁵ Israel has never signed the NPT. In early December 2012, the General Assembly of the United Nations, by a wide majority over the dissenting votes of the U.S. and Israel, called upon Israel to sign the NPT, which it has steadfastly refused to do for more than 40 years.

Article I of the Nonproliferation Treaty requires “Each nuclear-weapon State Party to the treaty [to undertake] not to transfer to any recipient whatsoever nuclear weapons or other explosive devices ... and in any way to assist, encourage, or induce any non-nuclear-weapon State to manufacture or otherwise acquire nuclear weapons... .” The U.S. government has not addressed how it has complied with this obligation in light of the NUMEC affair and other instances of the transfer of nuclear weapons technology, material and equipment from private parties in the United States to Israel and other countries.

The United Nations amended the NPT in 1977 by adding an Additional Protocol that gives IAEA broader monitoring powers than the original treaty. A number of countries have agreed to the Additional Protocol, i.e., the original five members of the nuclear club and some nonvolatile states. Notably, Algeria, Egypt, Iran, India, Israel, North Korea, Pakistan, Saudi Arabia and Syria have not signed the Additional Protocol.²⁸⁶

When President Johnson decided to forego insistence on Israel signing the NPT in

the arms deal he approved in 1968, it was with a full understanding that he was creating a precedent for other nations doing the same. He thereby undercut the treaty that others in his government had worked for more than a decade to establish. Johnson was specifically warned against this course of action earlier in his presidency when CIA issued a 1966 National Intelligence Estimate entitled “The Likelihood of Further Nuclear Proliferation.”²⁸⁷ The document warned the president of the hazards of establishing lenient proliferation precedents by pointing out that the reasons for proliferation are partly psychological and partly technical. A psychological reason is that nations hate to be left behind by others they view as equal or inferior. A technical reason is that some nations consider it necessary to enter the nuclear weapons field in order to keep abreast of scientific developments. The 1966 CIA Estimate noted that gaps and limitations in the safeguards systems could allow nuclear material and equipment to be transferred to nations seeking to join the nuclear club. An example cited by the Agency to illustrate that fact is redacted in the version of the document released to the public. Israel would have been a sterling example. Despite CIA’s warnings of the hazards of showing leniency to proliferating nations, President Johnson acquiesced to the Israeli weapons program and some questioned whether he abetted it.

Henry Myers speculated that President Johnson may have had motives to keep the Israeli atom bomb quiet other than protecting Israel, i.e., Johnson could not afford a scandal at the time. “That’s the last thing LBJ needed,” Myers said. “Here he was having hell [with Vietnam], so I can see why he told Helms to keep quiet.”²⁸⁸

President Johnson was troubled not only by the conduct of the war abroad but also by the antiwar movement at home. He ordered Helms to undertake domestic surveillance of antiwar demonstrators to try to prove that they were financed and controlled by Moscow. Such surveillance was a clear violation of CIA’s charter.²⁸⁹ Johnson encapsulated his obsession with Viet Nam when he described a recurring dream.²⁹⁰ If he faltered or failed in the war effort,

There would be Robert Kennedy out in front leading the fight against me, telling everyone that I had betrayed John Kennedy’s commitment to South Viet Nam. That I was a coward. An unmanly man. A man without spine. Oh, I could see it coming, all right. Every night when I fell asleep, I would see myself tied to the ground in the middle of a long open space. In the distance, I could hear the voices of thousands of people. They were shouting and running toward me. Coward! Traitor! Weakling!

It was not just Vietnam that troubled President Johnson in 1968. His Great Society initiatives were coming under budget pressure due to the war. In addition, a B-52 bomber crashed in Greenland, disgorging four undetonated nuclear weapons; the North Koreans seized the U.S. intelligence ship *Pueblo* in international waters; the nuclear-powered submarine *Scorpion* sank under mysterious circumstances in the eastern Atlantic; the Soviets invaded Czechoslovakia to crush the Prague Spring; and Saddam Hussein became vice chairman of the revolutionary council in Iraq. At home, the country reeled with the

assassinations of Martin Luther King and Robert Kennedy. Besieged, would Johnson have run the risk of secretly condoning or aiding the Israeli nuclear weapons program just so he could avoid bad press?

Avner Cohen had a different view on the matter. “Johnson was not deceived by Israel nor was he Israel’s accomplice. The U.S.-Israeli nuclear relationship was more subtle and nuanced than that. The subtlety and nuance allowed for the creation of a veneer behind which Israel and the United States did what they felt they had to do.”²⁹¹

On March 24, 1968, the president told United Nations Ambassador Goldberg on the phone that he grew more sympathetic to Israel’s plight as his own political fortunes declined. “They haven’t got many friends in the world,” the president said, and “they’re in about the same shape I am. And the closer I got—I face adversity, the closer I get to them... . Because I got a bunch of Arabs after me—about a hundred million of ‘em... . So I can understand them a little bit.”²⁹²

On March 31, 1968, Johnson announced that he would not run for re-election.

¹⁴ A classified copy of this April 2, 1968 letter was found in the papers of James Connor at the Gerald R. Ford Presidential Library. The CIA refused repeatedly to allow the Library to declassify the letter until March 2014 when the Interagency Security Classification Appeals Panel released the one-and-a-half-page document with about 12 lines redacted.

Part Three: The Genie, the Bottle and the Brain Drain

Chapter 8 Visitation (1968)

In 1968, FBI's interest in Shapiro and NUMEC expanded from the diversion of U-235 to the possibility that there was an ongoing transfer of sensitive nuclear technology to Israel by Shapiro and his associates. A visit to Apollo by leading agents of Israeli intelligence services contributed to this growing concern.

Movies and pulp fiction have touted the excellence of Israeli intelligence services for decades. Every spy junkie knows that Israel is superior to all other nations in its accomplishments in espionage and clandestine action. The coincidence between truth and myth is not accidental—David Ben-Gurion designed it that way. Israel's founders realized when they declared independence in 1948 that their survival in the midst of opposing Arab and Persian nations depended on excellent foreign intelligence. Early Israeli governments picked the leaders and provided the resources to institutionalize the diverse intelligence apparatus that helped win independence.

A testament to their success emerged in 1979 when Islamic militants overran the American embassy in Tehran and discovered a secret CIA study dated March of that year describing the superiority of Israeli intelligence activities. The study concluded, "Israel's intelligence and security services are among the best in the world. Their expert personnel and sophisticated techniques have made them highly effective, and they have demonstrated outstanding ability to organize, screen, and evaluate information obtained from recruited agents, Jewish communities, and other sources throughout the world."²⁹³

The Israeli intelligence community comprises several organizations, the three most important of which are Aman, Mossad and Shin Bet. In simple terms, Aman is responsible for military intelligence, i.e., learning of war preparations and capabilities of Israel's enemies; Mossad is responsible for foreign espionage; and Shin Bet is responsible for counter terrorism and internal security. Thus, Aman is analogous to the various arms of military intelligence in America; Mossad is analogous to CIA; and Shin Bet's scope resembles a combination of FBI and Secret Service. Aman reports to Israel's minister of defense, while Mossad and Shin Bet report to the prime minister. Unlike the division of responsibility between CIA (foreign) and FBI (domestic), Israel's three main security agencies utilize a shared operations unit that operates inside and outside the country. The operations unit was established in 1957, was accountable to all three intelligence organizations and in the 1960s was led by a man named Rafi Eitan and his deputy, Avraham Shalom (previously known as Avraham Bendor).²⁹⁴ Eitan and Bendor were involved in both the NUMEC affair and the case of the convicted American spy, Jonathan Pollard, among others.

A fourth Israeli intelligence unit was established in 1957 by then Defense Minister Shimon Peres, acting behind the back of the overall Israeli intelligence guru Isser Harel. The secret agency was called the Science Liaison Bureau. It reported directly to the defense minister. The Bureau became known in the intelligence community by its Hebrew

acronym, LAKAM. Its first director, who lasted in the job for 20 years, was a former Shin Bet operative named Binyamin Blumberg. The first assignments of LAKAM were to maintain security inside the Ministry of Defense, in particular the Dimona nuclear facility.²⁹⁵ Israeli intelligence officials have said that LAKAM's original reason for being was to collect scientific intelligence behind friendly lines in the West.²⁹⁶

When France scaled back its support of Dimona in the mid 1960s, LAKAM began purchasing parts and materials for plutonium production at Dimona from other sources. LAKAM was also responsible for hiding the true mission of Dimona when America sent scientists to inspect the site. LAKAM simply arranged for the U.S. experts to see many other things, leaving scant time for their tours of Dimona. When another contingent of U.S. experts visited the site in January 1964, LAKAM built "a Potemkin Village, a parallel control room full of dials and buttons, computer controlled to simulate the operation of a small-scale nuclear research facility." LAKAM also bricked off the entrances to other parts of the facility thus concealing its true size and scope. The non-Hebrew speaking American experts were duped, telling U.S. and Egyptian authorities after their visits that the facility had no weapons function.²⁹⁷

LAKAM also sent its personnel abroad as science attaches in large Israeli embassies in Europe and the United States. They collected scientific publications in their postings and befriended native scientists who might assist Israel. LAKAM also recruited the assistance of Israeli scientists who traveled abroad, asking them to collect information useful to the nuclear weapons program, even if they had to steal it.²⁹⁸

FBI learned of LAKAM's activities in the United States in 1968 and undertook a secret project with the code name "Scope" to track movements of Israeli scientific delegations and embassy personnel in the United States. At first, FBI did not disclose the Scope project to CIA, thus adding to the long line of interagency feints and deceptions. The project included FBI wiretaps on the Israeli embassy that produced incriminating information leading to expulsion of some Israelis from the country. When CIA learned of the expulsions, it pushed back on Scope and on FBI's attempt to curtail Israeli intelligence activities. After all, the Israeli intelligence agencies were CIA's partners in spying on the Soviets. Hoover speculated that Helms was playing a double game and might be a partner in Israeli scientific espionage, including the very case that Helms had asked FBI to investigate, the appearance of U.S.-enriched uranium near Dimona.²⁹⁹ Riebling said there was a Scope assessment of Shapiro's involvement with Rafi Eitan when the latter was head of LAKAM.³⁰⁰ If so, FBI has released no documentation on that assessment.

Riebling also told of another Scope case involving Yuval Ne'eman, who was trailed by FBI and found to be working for LAKAM. When ordered to register as a foreign agent for the Israeli government or risk deportation, he appealed through Mossad's station chief in Washington, who contacted James Angleton at CIA, who contacted William Sullivan at FBI. The Bureau backed down and Ne'eman was allowed to continue his activities in America. The Ne'eman incident must have sent a message to Israeli intelligence operatives with friends and contacts in the American scientific community: The United States tolerated the sharing of sensitive military technology with Israel.

Ne'eman was the physicist who invited Edward Teller to Israel in 1966 and 1967

when Teller first learned of Dimona and its nuclear weapons mission. Born in Tel Aviv in 1925, Ne'eman was known in Israeli nuclear circles as "The Brain." He is credited with designing Israel's first atom bomb. He was a visiting professor at the California Institute of Technology when FBI detected his espionage activity. Flush with U.S. rocket technology, he returned to Israel where he founded and twice led Israel's Science and Technology Ministry. He founded and chaired Israel's Space Agency. He was elected to the Knesset and served as Israel's Energy Minister. Thus, CIA apparently fostered one of the great ironies of the Cold War. It enabled Ne'eman's transfer of rocket technology from ex-Nazi scientists at the Jet Propulsion Laboratory to a nuclear weapons delivery system for Israel.³⁰¹

On September 6, 1968, AEC told FBI it was giving permission for NUMEC to entertain an unclassified visit by four Israeli citizens. At the time, Shapiro was president of the NUMEC subsidiary of ARCO. NUMEC, AEC and FBI documents listed credentials for the four Israelis.³⁰²

- Avraham Hermoni, Scientific Counselor, Israeli Embassy, Washington, DC;
- Dr. Ephraim Biegun, Group Leader, Department of Electronics, Ministry of Defense, Israel;
- Abraham Bendor, Department of Electronics, Israel; and
- Raphael Eitan, Chemist, Ministry of Defense, Israel.

The FBI redacted almost the entire declassified version of the seven-page document listing these names and affiliations and telling of their visit to NUMEC.

It is likely that FBI knew more about these four men than was disclosed by the information NUMEC provided to AEC. The Israeli experts at CIA must have known more: CIA officers had been working with Biegun, Bendor and Eitan for years, leading Riebling to opine that CIA's James Angleton had arranged their visit to Apollo.³⁰³ Peter Stockton, long-time senior investigator for subcommittees of the Energy and Commerce Committee of the U.S. House of Representatives had this to say about that possibility. "I met James Jesus Angleton many times. Once I said to him 'why did you help Israel get this stuff [the NUMEC uranium]?' Angleton said he didn't want fissile material to go to Israel because then it could go anywhere."³⁰⁴

More is known today about the four Israeli visitors in 1968 than NUMEC told AEC and FBI. At the time of the visit, Avraham Hermoni (1926-2006) was a chemist serving as Scientific Counselor, and LAKAM Station Chief in the Israeli embassy in Washington, a post he held from late 1968 to 1972. The FBI knew of Hermoni's activities in the U.S., including his establishment of a network for gathering technical intelligence. From 1959 to late 1968, Hermoni served as technical director (vice president) at RAFAEL.¹⁵ There he served as the technological eyes and ears for RAFAEL's boss, Munya Mardor. Hermoni oversaw RAFAEL's role in the nuclear project, which was under the direction of Shimon Peres, then serving as Israel's deputy minister of defense. Hermoni also introduced and put

into use, for the first time in Israel, the PERT methodology [Program Evaluation and Review Technique], which the U.S. Navy first used in managing the development of the submarine-launched Polaris missile. The U.S. launched its first Polaris in 1960. Hermoni came to Washington as Scientific Counselor in time for the September 1968 visit to NUMEC.³⁰⁵ After leaving the U.S. in 1972, he returned to a senior position with RAFAEL.³⁰⁶ The 1968 meeting at Apollo was not Hermoni's only encounter with Shapiro; ten years later, Shapiro told Congressman Udall that he and Hermoni had other meetings.³⁰⁷ At the time of the 1968 visit to NUMEC, Hermoni was an accredited Israeli diplomat and must have known the true identities of the other three visitors. Thus, he participated in and likely orchestrated the lie to U.S. officials about the identities of his companions.³⁰⁸

Decades later, in a brief biography of Hermoni, Avner Cohen told the story of a chance meeting that occurred while Hermoni was the science attache at the Israeli embassy in Washington.³⁰⁹

One evening, during an intermission of a cultural event at the Kennedy Center, Hermoni noticed John Hadden, the former CIA station chief in Tel Aviv (1964-68), in the audience. Hermoni knew well that one of Hadden's most important tasks while in Israel was to monitor the nuclear project. As they recognized each other in distance, Hadden shouted, "Avraham, does it work?" to which Hermoni promptly responded, "One hundred percent it does." Both laughed.

At the time of his visit to NUMEC, Ephraim (Froike) Biegun headed the technical department in the secret service of Israel (Shin Bet). He was born in 1932 and sent to the U.S. as a young man by senior Israeli intelligence administrators to learn about modern technology. Upon his return, he served from 1954 to 1957 in the technical unit of Shin Bet. He headed that unit from 1960 to 1970 and from 1970 to 1977 was the consul for scientific affairs in Israel's New York consulate. Avraham Bendor/Shalom said of Biegun, "Froike has done things that until then we had only read about in the books."³¹⁰

At the time of their visit to NUMEC in 1968, Rafi Eitan and Avraham Bendor/Shalom were the director and deputy director, respectively, of the covert operations unit that served Shin Bet, Mossad and Aman. In addition, they were on special assignment to LAKAM. Their participation was possible because LAKAM's director, Binyamin Blumberg, had established good relations for his small, secret agency within the Israeli intelligence community and was able to use Bendor and Eitan's services in advancing the Israeli nuclear weapons program.³¹¹

Bendor, who later changed his name to Avraham Shalom, worked for Shin Bet for 35 years and headed that agency from 1981 to 1986. He was born in 1928 and accompanied his parents from Germany to Palestine in 1933.



Avraham Bendor
Director of Shin Bet
1981-1986

He served in Palmach, the fighting force of the Haganah, and participated in some of Shin Bet's most notorious operations. For example, he served on the team of Israeli agents that captured Nazi war criminal Adolph Eichmann in Argentina in 1960, returning Eichmann to Israel where he was tried, convicted and executed for his role as Hitler's administrator of the "final solution." After serving as deputy to Rafi Eitan in the covert operations organization, Bendor headed the Protective Services Branch of Shin Bet and then became the agency's director in 1981. He resigned under pressure in 1986 for ordering and then attempting to cover up the beating deaths of two Palestinians who blew up an Israeli bus. "Avrum lied and kept lying," a senior security official involved in the bus affair recalled in 1995. "He failed because he was too sure of himself and too used to hearing how great he was."³¹²

Israel's President Chaim Hertzog pardoned Bendor/Shalom for his role in the beating deaths, and, after the dust settled, Prime Minister Peres helped him get a job with Shaul Eisenberg, a former Mossad agent who owned companies worldwide, some engaged in aircraft and arms sales. While working for Eisenberg, Shalom went back to his original name of Bendor and worked out of New York. Although he made good use of his background in selling defense contracts, he could not get a job in Israel because of his notoriety.³¹³

NUMEC's fourth visitor in September 1968 was Raphael (Rafi) Eitan. He is not to be confused with General Rafael "Raful" Eitan, onetime chief of staff of the Israeli army. Rafi Eitan was born on Kibbutz Ein Harod in 1926. His parents had emigrated from Russia to Palestine in 1923. He joined the Haganah in 1938 at the age of 12, and soon swore an oath of allegiance to Zionism. In 1944, he joined the Palmach, a commando unit of the Haganah. He attended the London School of Economics after high school. He served with the Palmach during Israel's 1948 war for independence. His first commander was Yitzhak Rabin. He and his brother changed their last name to Eitan in 1948. He became an intelligence operative and moved up in the ranks of Mossad, eventually becoming leader of the joint operations department that served the three Israeli intelligence agencies. Eitan led the team that captured Adolph Eichmann in Argentina in 1960. He became deputy chief of operations of Mossad (1963 to 1972) and chief organizer of the Mossad/LAKAM team in the Plumbat affair that diverted 200 tons of natural

uranium oxide (yellowcake) from Europe to Israel in 1968. Eitan left Mossad in the mid 1970s when it became clear he would not be selected to lead the agency.³¹⁴



Rafi Eitan
Mossad and LAKAM
1950-1985

Eitan reportedly left Mossad embittered, angry and determined to settle the score. His close friend Ariel Sharon, who joined him in exile from government, became minister of agriculture in 1977 and convinced newly elected Prime Minister Menachem Begin to retain Eitan as an advisor on counterterrorism. When Sharon became defense minister in 1981, he chose Eitan to replace Binyamin Blumberg as director of LAKAM, while maintaining Eitan's role as counterterrorism advisor to the prime minister.³¹⁵ Eitan was serving as Begin's assistant during Israel's bombing of the Osirak nuclear reactor in Iraq in 1981 and the earlier bombing of the reactor's fuel while it was stored in Paris. He also played a role in planning the invasion of Lebanon in 1982, serving as liaison to Bashir Gemayel, leader of the Lebanese Phalangists. When Sharon left government in 1983, after being found responsible for the massacre of Palestinians in refugee camps outside Beirut, Eitan stayed on as head of LAKAM and served as counterterrorism advisor to Yitzhak Shamir, Begin's successor.³¹⁶

In 1985, Eitan resigned from his dual posts following public disclosure of his authorization and then direct involvement in Jonathan Pollard's spying on U.S. naval intelligence. Within days, the Israeli government organized an initial post-event investigation led by a three-man team that included Avraham Shalom (Bendor). Shalom and his colleagues soon concluded that Pollard was part of a "rogue" intelligence-gathering unit that was intended, among other things, to find out if America was spying on Israel.³¹⁷

Although the government of Israel was aware of Eitan's activities with Pollard, it left Eitan out in the cold. Journalist and author Wolf Blitzer opined that Eitan authorized the Pollard gambit as a means to settle the score with Mossad. To a degree, he succeeded. David Megan, one of Eitan's supporters in the Knesset, said, "During this period in which Eitan headed LAKAM, it reached the peak of its achievements." A security official who

testified to a special committee of the Knesset that investigated the Pollard affair echoed this sentiment, “since Rafi arrived, we called [LAKAM] ‘Rafi.’ The material Rafi Eitan was made of was more than once described by the highest echelon as ‘priceless.’”

The verdict on Eitan was not unanimous. Another Israeli official said that when the Pollard caper grew increasingly dangerous, Eitan refused to call it to a halt, “He was like an alcoholic. He needed just one more drink—and then he would quit.” Pollard was harsher, “The quality of tradecraft exhibited by Rafi in this affair was less than poor—it was criminally irresponsible.” Blitzer gave a more balanced summary of the spymaster’s performance, “Eitan, for his part, has said publicly that he was authorized to recruit and run Pollard. He has refused to say who provided him with that authorization, although ... a lifetime of experience in spying (including in the United States) must have convinced him that that authorization was simply built into his LAKAM mandate.”³¹⁸ After months of recriminations, and a promise from the government of Israel to disband LAKAM, the Pollard affair blew over.

Later, when Sharon was elected prime minister, he appointed Eitan to chair Israel Chemicals, the largest state-owned industrial company. After 1993, Eitan was involved in large scale agricultural and construction ventures in Cuba. In June 1997, he allegedly told an Israeli newspaper reporter,³¹⁹

I failed in the Pollard affair, just as I failed in other intelligence operations beyond enemy lines. That is the lot of an intelligence officer who runs complex intelligence operations. When you work a lot and do a lot, especially in the intelligence field, you win some and you lose some. Nobody knows either about your successes or your failures. It doesn’t cause a fuss. But this was a big fuss. You take such a possibility into consideration, but there is nothing you can do about it.

Eitan’s referral to the Pollard operation as “beyond enemy lines” shows how at least one high-ranking member of the Israeli intelligence community viewed its relationship with America.

Eitan was elected to the Knesset in March 2006 as head of the Gil Pensioners Party and served as Israel’s minister for pensioners.³²⁰

Late in 2012, the National Security Archive at George Washington University released a newly declassified 1987 CIA damage assessment of the Pollard case. In that report, CIA recorded Pollard’s statements that Rafi Eitan briefed him in Paris in November 1984 on operational planning and tasking for his espionage in the United States. Pollard said Eitan was then advisor to Prime Minister Shamir on counter terrorism and was in charge of Pollard’s activities. At one point Pollard said Eitan asked him to provide “material reporting ‘dirt’ on Israeli political figures, any information that would identify Israeli officials who were providing information to the United States [redacted].” He also said he was “sworn in” as an Israeli citizen during the meeting with Eitan in Paris. He added that Eitan downplayed security concerns and pledged that, in any case, Israel would “take care of” Pollard if he were caught.³²¹

In early 2013, the 86-year old Eitan was still controversial. The *Times of Israel* quoted him at length regarding Ariel Sharon’s plans in 2006 for dividing the West Bank

with the Palestinians. Eitan recounted private conversations with Sharon on that matter and then leaped into a host of current events. Besides lamenting that President Obama had not agreed to free Jonathan Pollard from prison, Eitan told the reporter that America made “fatal mistakes” in its handling of the “Arab Spring” in Egypt. Eitan criticized U.S. Secretary of State Hillary Clinton by name. “This is idiocy—an act of stupidity that will resonate for generations.” Eitan also justified holding prisoners in solitary confinement and hiding their identity from the public, but said it was getting harder to do so because of growing liberalization of Israeli censorship rules. “Now, keeping secrets is hard.”³²²

In December 2014, Eitan was once again in the news claiming that Pollard’s 30-year tenure in U.S. prisons was Pollard’s fault. If he had followed Eitan’s instructions, he would have escaped to Israel when brought under FBI scrutiny. Instead, he ran to the Israeli embassy where Eitan claimed there was no alternative but to deny him access, thus abandoning him to the FBI.³²³ Pollard’s supporters in Israel took an opposing view. One noted, “Eitan’s wife, who interviewed alongside her husband on the same program, described her husband as ‘a man who can lie convincingly without blinking an eye.’”³²⁴

The U.S. government paroled Pollard on November 20, 2015. Israeli and American government spokespersons denied that his release had anything to do with the nearly simultaneous deal the United States and others had made with Iran to curb its nuclear weapon enterprise. His lawyers served on a pro bono basis, stood by him for years and arranged housing and a job for him in anticipation of his release.³²⁵ The length of his imprisonment was controversial. To some it was not long enough. “This was one of the 10 most serious espionage cases in history,” said Joseph E. diGenova, the former U.S. attorney who prosecuted Pollard. “I’m delighted he served 30 years. I wish he would have served more.”³²⁶ Morton A. Klein, national president of the Zionist Organization of America, expressed a contrary view, “We are delighted to learn that Jonathan Pollard has been released from prison... . [He] is the only American citizen sentenced to life in prison for passing classified information to a U.S. ally—in this case Israel. There was, thus, no treason involved.”³²⁷ Klein’s argument neglects an earlier case of espionage on behalf of an American ally. In 1953, the United States executed Julius and Ethel Rosenberg for passing atom bomb secrets to the Soviet Union during World War II when the USSR and the United States were allies.

Pollard was not Israel’s only spy in the U.S. to be managed by Shimon Peres and Rafi Eitan. Another of their proteges operated here with impunity for decades. On July 18, 2011, Yossi Melman, writing in the Israeli newspaper *Haaretz*, reported on a biography, *Confidential: The Life of Secret Agent Turned Hollywood Tycoon*, about Hollywood producer Arnon Milchan, a billionaire Israeli citizen.³²⁸ The book described how Milchan led a double life as a longtime weapons dealer and Israeli intelligence agent who purchased U.S. equipment for Israel’s nuclear weapons program at the same time he made his way into Hollywood’s inner circle of super-wealthy movie moguls. Biographers Gelman and Doron recount Milchan’s life story, including his friendships with Israeli prime ministers, U.S. presidents and Hollywood stars.³²⁹ Milchan’s services to the Israeli security services were long rumored, but in an interview with his biographers, he

confirmed his espionage activities for the first time, including the fact that Benjamin (Binyamin) Blumberg first met him in 1965 in the Tel Aviv office of the Zionist Organization of America. The book quotes former Israeli President Shimon Peres, a close friend of Milchan, as saying, “I am the one who recruited him.”

Milchan’s recruitment apparently occurred in the 1960’s when Peres was Israel’s deputy minister of defense and Lyndon Johnson was president of the United States. Milchan served as an agent for LAKAM until it and Rafi Eitan were removed from the U.S. in the wake of the Pollard affair. According to Melman’s account of the book, “Blumberg was Milchan’s friend, and used him (as well as other Israeli businessmen) to set up straw companies around the world, and to open secret bank accounts for financing the nuclear plant in Dimona and other Israeli security industries... . Besides using businessmen, LAKAM also appointed scientific attaches in Israeli embassies around the world. After he was fired, Blumberg was replaced by Rafi Eitan, who continued to use [Milchan’s] services.” The news account goes on:

For years, Milchan operated in secret, yet in the mid-1980’s U.S. customs uncovered an attempt to smuggle ‘switches’—equipment that can be used both for medical purposes and for nuclear weapons manufacture... . Richard Kelly Smyth [American physicist and business associate of Milchan] was arrested and released on bail. He fled the country soon after.

Smyth was declared a fugitive, and according to some reports found refuge in Israel. In 2001, he was captured in Spain and was brought back to the U.S., where he stood trial and was incarcerated. The FBI began an investigation into Milchan’s affairs, yet he has never been charged.

According to the book, right after the ‘switches’ fiasco Milchan called his friend Peres, then prime minister, and asked for his help in dealing with the Ronald Reagan administration. Milchan is quoted in the book as saying he never received money for his services, and that everything he did was for the state of Israel.

More importantly, because it bears on the possible role of President Johnson in the NUMEC affair, Peres is quoted in the book as saying, soon after the switches fiasco,

Arnon, what do you want me to do? Go public and explain how the president of the United States and I got together to use you to get things for Israel that can’t be obtained through regular channels?

On March 30, 2012, on a blog site advertising their book, Doron and Gelman noted that Israeli Prime Minister Benjamin Netanyahu and President Shimon Peres asked Milchan to avoid any public discussion of *Confidential*, asserting that the matter was “too sensitive at this time” (that was when Israel was lobbying the U.S. Congress to not deal with Iran on nuclear arms). Another reason to downplay the book was Netanyahu’s collaboration with Smyth’s smuggling operation. In the words of Smyth’s FBI interrogators,³³⁰

Smyth and [Netanyahu] would meet in restaurants in Tel Aviv and in [Netanyahu's] home and/or business. It was not uncommon for [Netanyahu] to ask Smyth for unclassified material.

Undeterred by such political advice and apparently proud of his role as a nuclear spy, Milchan spoke with an Israeli investigative journalist, in November 2013, in the company of Robert DeNiro,³³¹

He [Milchan] used at least one big-name actor's star quality to lure U.S. scientist Arthur Biehl—an expert on nuclear weapons and a co-developer of the hydrogen bomb—to a meeting. According to the report, Milchan invited Biehl to the actor's home under the pretense that the actor was seeking scientific advice for a project he was working on. Milchan said he thought Biehl would cooperate because, "Anyone who lives in California is a 'star-fucker.' ... They hear star ... they come running."

Despite these admissions, Milchan continues to thrive, having produced more than 150 motion pictures, including recently acclaimed films such as "The Revenant," "Gone Girl" and "Birdman." In its 2015 listing of the world's wealthiest people, *Forbes* magazine reported that Milchan had a net worth of \$5 Billion. He was the 301st wealthiest person in the world, third in Israel, and owned seven homes around the world.³³²

Milchan's story resembles Shapiro's in several ways. For starters, they both got away with their questionable activities in the United States on behalf of Israel. They also both started out as representatives of the Israeli Ministry of Defense in its dealings with American companies. Furthermore, Blumberg and Eitan's running of Pollard, Milchan and Smyth in America as spies for Israel raises the possibility that Blumberg and Eitan did the same with their friend and acquaintance, Zalman Shapiro. A CIA report released in late 2012 provided insight to LAKAM'S recruitment methods. "The Israelis are prepared to capitalize on nearly every kind of agent motivation. A substantial effort is made to appeal to Jewish racial or religious proclivities, pro-Zionism, dislike of anti-Semitism, anti-Soviet feelings (if applicable) and humanitarian instincts. Blackmail is also used. Other recruiting techniques include the proffer of money, business opportunities, or release from prison."³³³



NUMEC Office in Apollo

Thus, in September 1968, Shapiro sat down in NUMEC's offices in Apollo, across the street from the uranium plant, with elite senior operatives of arguably the best intelligence service in the world. Two of them were on special assignment to LAKAM, the most secret of Israeli intelligence organizations whose primary mission was to advance Israel's nuclear weapons program in any way it saw fit. One of them, the scientific counselor, was the LAKAM liaison in Washington.

After the meeting, NUMEC told the AEC that the four Israelis had asked to buy thermo-electric generator systems of 5 and 50-milliwatt power levels fueled by 2 and 20 grams of plutonium, respectively. NUMEC did not indicate the intended use of the generators, other than to say, "The generators are of the terrestrial type." NUMEC also told AEC that the four Israelis had visited other nuclear organizations in the U.S. to develop proposals on these items.³³⁴

In light of LAKAM's mission and the fact that Dimona's fuel reprocessing plant was producing plutonium by 1968, the four Israeli visitors may have been looking for advice from as many metallurgists as they could find that were willing to talk about the fabrication of plutonium components. Clearly, Shapiro and other NUMEC employees were experts in that area. In fact, this type of information had been passing from NUMEC to Israel for several years.

In the early 1960s, Shapiro hired an Israeli nuclear scientist to work at NUMEC. The AEC told the FBI that the scientist was Baruch Cinai. Shapiro said the scientist's name was Dr. Bernard Cinai and that he worked at the Parks Township facility. Shapiro said that NUMEC had permission from AEC for Cinai to work at Parks under the Atoms for Peace program and that Cinai worked on mixed oxide (plutonium and uranium dioxide) fuel design for nuclear power plants. Investigative journalists Andrew and Leslie Cockburn cite an AEC report saying Cinai was granted unescorted access to security areas.³³⁵ At the Parks Township site, Cinai was working with NUMEC scientists, including Shapiro, who knew as much about uranium and plutonium metallurgy as

anyone, including experts working in America's nuclear weapons plants.

Thus, by September 1968, Israeli scientists had the opportunity to have known everything Shapiro and his staff could teach them about plutonium metallurgy, or small plutonium-powered electrical generators for that matter. Furthermore, with hindsight, it is not plausible that a technical discussion of plutonium generators and plutonium metallurgy at the NUMEC office in Apollo in September 1968 would require attendance by intelligence officers with the seniority and meager technical background of Bendor and Eitan. There must have been another agenda for the September meeting.

There have been several explanations advanced for why the senior LAKAM operatives visited NUMEC in 1968, other than the cover story that they were there to procure plutonium-powered electricity generators. One explanation is that their trip was "damage assessment" to learn how much progress had been made in FBI's investigation of NUMEC. That explanation is flawed because they surely would not have held a meeting that confirmed the existence of a conspiracy at the same time that U.S. authorities were closing in on the conspiracy. The FBI had another explanation, i.e., the Bureau thought Shapiro was divulging classified or sensitive nuclear information to his visitors through his own actions and by soliciting other sympathetic experts to whom the LAKAM visitors were introduced. CIA station chief John Hadden apparently agreed with this assessment. Shapiro provided another explanation—the meeting with other scientists included a secret project to protect Israeli water supplies. Shapiro is not the only U.S. scientist to say that Israel asked him to help protect water supplies. Edward Teller said he provided aid of this kind during his 1965 trip to Israel.³³⁶ It is difficult to imagine why Israel would ask Dr. Edward Teller, distinguished physicist and father of the hydrogen bomb, or Dr. Zalman Shapiro, distinguished metallurgist, to opine on the security of water supplies.

Another possible reason for the 1968 meeting was for Shapiro to give the four Israelis his best advice on how to use HEU diverted to Israel from Apollo. However, by 1968 some of the HEU stolen from Apollo surely would have been converted to fuel for atom bombs or booster rods for Dimona.

Still another possibility is that the four visitors were well along in their planning for the Plumbat affair that would be consummated within weeks of their visit to Apollo. The material they were about to steal was yellowcake (uranium oxide) and the Israeli intelligence agents might have been seeking Shapiro's assistance in designing equipment for processing that material into fuel for the Dimona reactor. The facts that Shapiro was a leading expert in such technical matters, that NUMEC routinely processed uranium hexafluoride into uranium dioxide for reactor fuel and that Shapiro traveled to Israel in late November and early December, shortly after the stolen yellowcake arrived, lend credence to this "technical assistance" explanation for the strange visit to Apollo.

Another possible explanation for Shapiro's meeting with the spies is that the relationship between NUMEC and Israel had to change if HEU was to continue to be diverted from Apollo, which by then was owned by ARCO. That is, the LAKAM agents might have been at Apollo to view the plant first hand to see how to remove more HEU and transport it to Israel now that the plant had new owners. *United Press International*

advanced this idea when it relied on the opinion of Anthony H. Cordesman, a former Pentagon official, in the aftermath of the Jonathan Pollard case.¹⁶ He opined that Eitan's participation in the 1968 meeting with Shapiro was "extremely hard evidence that he [Shapiro] has been operating with Israeli intelligence in the United States... . There is no conceivable reason for Eitan to have gone (to the Apollo plant) but for the nuclear material."³³⁷ A variation of this idea is the possibility that there was an off-inventory stash of HEU still at the plant and the Israeli agents were there to pick it up and take it to Israel. As officials of the Israeli government, albeit different agencies than they claimed, the visitors probably were there on diplomatic passports, which may have provided some degree of diplomatic immunity.

The four spies probably would have run the risk of coming to Apollo as a group only because they needed to see or do something themselves.

On November 3, 1968, Shapiro hosted a meeting at his home with eleven scientific and technical people, some associated with AEC programs, and Avraham Hermoni.³³⁸ It took another 9 months for the AEC and the FBI to learn more about this meeting. The AEC interviewed Shapiro on August 14, 1969 and learned of Hermoni's request that each of the individuals at the meeting undertake certain information gathering assignments on behalf of Israel.

In late November 1968, just two months after Hermoni, Biegun, Bendor and Eitan visited NUMEC and met in an office across the street from the most advanced facility in America for converting uranium into nuclear reactor fuel, Mossad and LAKAM accomplished an extraordinary coup for Dimona. The Israelis diverted 200 tons of natural uranium in the form of yellowcake from Europe to Israel. A West German firm acting as a cutout for Mossad purchased the uranium from a Belgian firm and shipped it from Antwerp to Milan on the cargo ship *Scheersberg A*. The uranium was packaged in 560 barrels bearing the codename for the operation, Plumbat, the Latin word for lead, stenciled in yellow on their lids. The ship was intercepted in the open seas between Cyprus and Turkey, and the yellowcake was offloaded to an Israeli freighter. *Scheersberg A* failed to arrive in Italy on schedule but showed up a few days later in a Turkish port, absent the yellowcake and its original crew. Although the Israeli government denied any involvement in the disappearance of the uranium, the complex operation was executed with the skill of an expert covert-action apparatus that had exercised great care in planning and execution.

The 200 tons of natural uranium, enough to fuel Dimona for a decade, arrived in Israel in early December. Zalman Shapiro arrived in Israel about the same time.³³⁹

The European Atomic Energy Commission (Euratom) informed the AEC about the Plumbat affair, but neither Euratom nor AEC told the public. On July 7, 1970 DCI Helms told a secret session of the Senate Foreign Relations Committee that the Plumbat uranium was being used at Dimona to develop nuclear weapons. If Israel did not yet have the bomb, he said, she was "seven and a half months pregnant."³⁴⁰

Euratom, CIA and AEC sat on the story until a former newspaperman and aid to Senator Abraham Ribicoff (D-CT), Paul Leventhal, revealed it at an April 1977 anti-nuclear conference in Salzburg, Austria.¹⁷ David Burnham of the *New York Times* reported on the text of Leventhal's speech the day before it was delivered. The government of Israel refused to comment on the article, but three U.S. State Department officials told the *Times* that they had heard stories about the missing uranium. "I never saw the actual report," one said, "but I heard about it from four or five colleagues and I am certain it occurred." Burnham went on to say, "In another development, a formerly high-ranking United States intelligence official said that he had seen intelligence reports several years ago that Israel had obtained some quantities of uranium in the United States by 'surreptitious and illegal means.'"³⁴¹ Thus, Burnham linked the NUMEC affair in the United States with the Plumbat affair in Europe.

The clues to the audacious theft of yellowcake on the high seas had spread by word of mouth until Leventhal heard them in the cocktail circuit in Washington, DC. He got some of the details wrong, but he was correct on the essential sequence of events. The ensuing publicity forced Euratom to reveal what it knew.

The truth of the Plumbat affair might never have come to light but for an amateurish secret agent named Dan Aerbel. Norwegian authorities captured and imprisoned Aerbel for his part in a botched Mossad operation to assassinate an Arab terrorist. The Mossad assassins killed the wrong man, and Norwegian authorities apprehended most of them. To gain better treatment for his role in the assassination, Aerbel let slip some clues about the planning and execution of the Plumbat affair. He also told the Norwegians that he had acquired the cargo ship *Scheersberg A* for Mossad.³⁴²

Thus, in late 1968, within two months of visiting NUMEC and talking to Shapiro about miniature plutonium-powered electricity generators, Rafi Eitan and his fellows pulled off the largest uranium heist in history. Interesting circumstances surrounded these events:

- Israel had not yet fabricated fuel for Dimona (the French manufactured the original fuel);
- Israel was about to acquire 200 tons of natural uranium in the form of yellowcake;
- The Plumbat affair required months of planning; and
- NUMEC was America's leading uranium fuel manufacturer.

Knowing these circumstances, in retrospect, Eitan's agenda at Apollo might have included the transfer of technology on uranium fuel fabrication to Israel. Shapiro's fortuitous arrival in Israel just after the 200 tons of yellowcake supports this hypothesis. So did an FBI wiretap. On February 20, 1969, a month after Shapiro's return from Israel, the FBI recorded a conversation, which confirmed that nuclear fuel design and testing were of mutual interest to Shapiro and the Israelis.³⁴³

[Redacted] who was at the Israeli Embassy, Washington, DC, told

Shapiro that he was sorry about ‘the cables back and forth’ regarding tests and in the future he would come to the United States and have Shapiro’s firm conduct the ‘tests.’ [Redacted] told Shapiro he would like to send Shapiro drawings and specifications of the ‘fuel elements’ and desired an estimate of the costs per element. [Four lines redacted.]

Ken Follett rendered the Plumbat affair in fictional form in his novel Triple, published in 1979, two years after Leventhal broke the true story. Set in the Middle East and Europe in 1968, the novel reached the top of the *New York Times* best-seller list. In Follett’s fictionalized account, the Palestinian Fatah and the Soviet KGB discover Mossad’s plans for diverting 200 tons of yellowcake on the high seas between Antwerp and Genoa. Tense encounters ensue when the operation is blown and an aging Mossad operative, whose handler bore a physical resemblance to Rafi Eitan, wins the final shootout and the hand of the nubile half-Palestinian daughter of an Oxford professor. In a postscript to the novel, Follett cited a story in the London *Daily Telegraph* of May 7, 1977, “Israel is believed to have been behind the disappearance from the high seas nine years ago of a uranium shipment large enough to build 30 nuclear weapons, it was disclosed yesterday. Officials say that the incident was ‘a real James Bond affair’ and that although intelligence agencies in four countries investigated the mystery, it was never determined what actually happened to the 200 tons of uranium ore that vanished.” More precisely, the diverted material was yellowcake, which is processed uranium ore.

Shapiro was involved with other Israeli intelligence agents besides the four visitors to NUMEC in September 1968. That same month, FBI wiretaps revealed that Colonel Avraham Eylonie, a senior official of Israel’s Military Intelligence Service, was in the United States and had several meetings with Shapiro in Apollo and Washington, DC.³⁴⁴ Shapiro also met a number of times with Israel’s science attaches/intelligence agents, Avraham Hermoni and Jeruham Kafkafi. The FBI’s wiretap transcripts and Shapiro’s statements to Congressman Udall disclosed meetings with high-ranking representatives of Israeli military intelligence in Israel. Shapiro also acknowledged to Seymour Hersh that he knew Binyamin Blumberg, the Director of LAKAM, saying, “‘I never said I didn’t know him.’ But he denied revealing any American secrets or diverting any materials. ‘I worked my butt off to assure the security of this country [presumably the United States]—do you think for a moment I’d do anything to impair its security?’”³⁴⁵ Although Shapiro may have thought it was ok to give nuclear secrets to Israel, an ally of America, it was and still is a criminal offense under several federal laws, including the Atomic Energy Act. A court took a strict view of this matter in the Pollard case. After his conviction for treason for providing defense and espionage secrets to Israel, the judge sent Pollard to jail for life and his wife to jail for five years.³⁴⁶ As noted before, Pollard was paroled in November 2015.

It is worth digressing to examine the arguments that Pollard presented to defend his stealing from America for the benefit of Israel for they were similar to Shapiro’s statements to Congressman Udall in December 1978 and AEC Security Director Riley in

August 1969. In Pollard's words:³⁴⁷

For years our family took quiet pride in my late uncle's decision to provide the fledgling Israeli Army in 1948 with military boots and medical supplies "liberated" from the American Hospital in Paris, which he commanded at the time... . All the time growing up, all I heard was stories of individuals we knew—very close friends—who had performed what I call their racist obligation to Israel in 1948. This is the term which I grew up with. [Sometimes it meant] shot gunning a trainload of illegal dynamite through San Antonio, stevedoring a covert Israeli arms shipment at night in Galveston, spiriting a stripped down aircraft out of an Air Force Reserve park in the desert—all these things... . In addition, many of the leading members of the local Jewish community I met while growing up in Texas ... participated in other types of activities that were of critical importance to Israel during the War of Independence, which ranged from the organization of munitions shipments to the acquisition of surplus bombers... . [These people also faced] a situation in which something less overt and probably of a confidential nature would be expected of [them]. For example, Jewish homes were expected to be made available for visiting Israelis, who were not to be disturbed for days on end. While Jewish businessmen were routinely used to quietly broker the transfer of sensitive material or processes needed by the Israeli armaments industry.

A November 1968 memorandum recorded insights gained through FBI wiretaps of Shapiro's phone conversations, including contacts with Israeli intelligence agents.³⁴⁸

This memorandum sets forth excellent results we have obtained from our telephone surveillance on subject's residence.

We are investigating Shapiro to determine extent of his relations with Israeli Government. As head of Nuclear Materials and Equipment Corporation, Apollo, Pennsylvania, which processes uranium-235 for nuclear reactors, Shapiro has access to atomic energy material, which could be most helpful to the Israelis.

We have developed live sources concerning Shapiro's activities, but our most productive source is telephone installation on his residence. This source has indicated subject has been in contact on two occasions with Dr. Avraham Hermoni, Scientific Counselor, Israeli Embassy, Washington, D.C., an Israeli intelligence agent. Source has also disclosed contacts with a senior official of Israeli military intelligence, individuals associated with Israeli Atomic Energy Commission, and member of Israeli Internal Security Service [probably Avraham Bendor of Shin Bet]. In addition, source has alerted us to subject's contemplated travel to Israel during latter part of November 1968, and has indicated he is considering settling permanently in that country

and, if necessary, would fight for Israel. We have learned much concerning subject's travels and financial condition from this source.

Future investigation will endeavor to identify additional Israeli contacts of subject and reasons therefore.

¹⁵ RAFAEL is the Hebrew acronym for Weapons Development Authority, Israel's national center for weapons development. RAFAEL handled delivery systems and bombs for the fissile material supplied by Dimona.

¹⁶ Before becoming a director at the Center for Strategic and International Studies, Cordesman served as director of intelligence assessment in the Office of the Secretary of Defense. He also served in the State Department, on NATO International Staff, as director of policy and planning for resource applications in the Energy Department and as a security assistant to Senator John McCain.

¹⁷ In 1980, Leventhal was co-director of the U.S. Senate's investigation of the accident at Three Mile Island. We formed a respectful relationship.

Chapter 9

Divided Loyally (1969)

The FBI used physical and electronic surveillance to follow and report on Shapiro's activities through the remainder of 1968 and into 1969. The Bureau also relied on unnamed informants with advance knowledge of Shapiro's travel plans. For example, agents were in position and able to shadow Shapiro when he attended a meeting of the American Nuclear Society in Washington, DC in November 1968. FBI surveillance also revealed that Shapiro met Israeli citizens several times, including scientific attaches from the Israeli embassy.³⁴⁹

Hoover's agreement to provide and sustain in-depth surveillance of Shapiro after Helms' request in April 1968 was unusual because it diverted manpower from criminal cases and it was unlikely to lead to prosecution of Shapiro. In addition, it was unusual for Hoover to ask the Attorney General to authorize tapping Shapiro's phones. In that same period, FBI refused to tap the phones of suspected Soviet spies named by CIA because the Agency had insufficient evidence for a warrant. Apparently, neither of these concerns impeded FBI's surveillance of Shapiro.³⁵⁰

In November 1968, a confidential source told FBI that at the time of the Westinghouse Astronuclear contract in 1965 Shapiro was involved in the development and manufacture of food irradiators for Israel.³⁵¹ The source advised,

Had U-235 or any other nuclear material been available for shipment to Israel, it would have been a simple matter of placing the material in these food irradiator units in large quantities and shipped to Israel with no questions asked. Source said these food irradiators were legal shipments and with a notice printed on the side of the container indicating that the contents contained radioactive material, no one would have opened or examined them or had reason to question their contents.

In January 1969, FBI agents told Director Hoover that Shapiro had written to AEC Chairman Seaborg on October 8, 1968 to ask questions about licensing criteria for plutonium-powered generators of the type purportedly discussed with the LAKAM representatives in September 1968. Seaborg's November 20 reply to Shapiro (addressed to "Dear Zal") described the conditions that AEC would impose on such exports and the availability of the plutonium-238 isotope for such an application.³⁵² In their January memorandum, the FBI agents updated Hoover on the possibility of shipping purloined uranium to Israel in a NUMEC container for a food irradiator. The confidential source had provided his FBI contact with a four-page document describing the packaging that NUMEC used for the irradiators. FBI also learned through its telephone surveillance that while Shapiro was in Washington, DC on September 30, 1968, he spoke with Hermoni and Biegun and said, "Although there were problems, both were anxious to move ahead." It is unclear from the context of these FBI documents whether Shapiro and the intelligence operatives were discussing plutonium generators or some other project. The documents are clear that Shapiro departed for Israel via El Al Airlines from New York's Kennedy airport on November 28 and returned on December 12. Upon his return, the wiretap

revealed that Shapiro spoke with several people about business opportunities he had discussed while in Israel, the most promising of which was to create a research laboratory modeled after Battelle's Pacific Northwest Laboratory (PNL) in Washington State. At the time, PNL served the Hanford Works, one of two sites producing plutonium for the U.S. nuclear weapons program.

On January 20, the FBI's special agent in charge (SAC) of the Pittsburgh office reported to Hoover that during a recent trip to Israel Shapiro discussed business ventures similar to a chemical facility being built there by Allied Chemical Company. "It appears that if subject [Shapiro] can raise a million dollars or so within the next few years, he would not hesitate to move to Israel and establish some business in that country. This information is attributed to [redacted]."³⁵³ The Nuclear Services Division of Allied Chemical built a plant in Metropolis, Illinois to convert yellowcake to uranium hexafluoride, the feedstock for making natural uranium dioxide reactor fuel at the Apollo plant of NUMEC.

On January 24, the Pittsburgh SAC again wrote to Hoover to address whether there should be an interview of Shapiro.

Subject maintains an intimate and respected relationship with officials of the Israeli Government... . [Subject] discussed technical requirements of Israel with Israeli officials and intelligence personnel... . [Subject] has requested known acquaintances who are at least sympathetic to Israel to provide data on a variety of technical matters of interest to the Israeli Government.

The SAC went on to say, "Concerning the question of subject having diverted U-235 to Israel, that has not been resolved. The relatively few individuals interviewed in this matter, including former employees, revealed their suspicions of subject's activities, but produced no concrete information of value in this regard." The SAC noted the Israeli technical intelligence network being run in the U.S. by Hermoni and opined there were probably others. He noted that Shapiro and others involved in the case are very active and highly regarded in various Jewish organizations, "which exert some influence in this country." He also noted Shapiro, "has expressed no allegiance to the United States but has stated he would fight for Israel and is believed to be seriously contemplating migrating to Israel within the next several years." Finally, the SAC got to his bottom line:³⁵⁴

An interview with subject and/or others could conceivably cause some embarrassment to the Bureau and/or the new Administration. It is felt that disclosure by the subject, David Lowenthal and others of an investigation by the Bureau could be interpreted by the Israeli Government as being inimical to cordial relations between the Governments at a critical time.

The FBI seemed more interested in catching or at least thwarting a possible spy than finding out what happened to the missing uranium. The Bureau was also sensitive to potential pushback from Israel.

Richard Nixon was inaugurated as president on January 20, 1969. Chief Justice Earl Warren administered the oath of office while Pat Nixon held the *Bible* open to *Isaiah 2:4*. “They shall beat their swords into plowshares, and their spears into pruning hooks.” Nixon’s election gave Hoover a chance to get one up on CIA because he and Nixon had known each other for years and had been together socially at least a hundred times. “Shit, Hoover was my crony,” Nixon was later heard to say when his infamous tapes became public. Nixon had no such ties with Helms. The White House soon directed Helms to report to National Security Advisor Henry Kissinger rather than directly to the president.³⁵⁵

Just days before Nixon took office, NBC News reported that Israel either had an atomic bomb or would soon have one.³⁵⁶ Three weeks after Nixon became president, Hoover wrote to newly appointed Attorney General John Mitchell to describe FBI’s “intensive investigation” of Shapiro that had been underway since May 1968.³⁵⁷ The letter was a little over two pages and was mostly redacted before release by the FBI.

That same day, Hoover sent a memorandum to his senior managers describing a phone call from Attorney General Mitchell advising that President Nixon had two items he wished FBI to address.³⁵⁸ The second of the two was “atomic espionage that the President is quite interested in... . The Attorney General said he thought the President was talking about another country involving some American Nationals going back and forth. The Attorney General said he thought it was commonly referred to as the Shapiro Case (Mordecai Shapiro).” Hoover told Mitchell that a memorandum would be prepared to address the president’s interest in the case.

It appears that either President Nixon was worried about nuclear espionage or he was fishing for how much the Bureau knew about Shapiro. In either case, he made it a priority in his first month in the White House.

Seymour Hersh reported a different view of Nixon’s interest in nuclear proliferation than is implied by FBI’s response to Nixon’s inquiries about NUMEC. “Richard Nixon and Henry Kissinger approached inauguration day on January 20, 1969, convinced that Israel’s nuclear ambitions were justified and understandable. Once in office they went a step further: They endorsed Israel’s nuclear ambitions.” Hersh noted that Nixon and Kissinger opposed the spread of nuclear weapons in public while in private they encouraged Germany, Israel and Japan to get the bomb. Hersh quoted Morton Halperin, Kissinger’s aide, who said, “Henry believed that it was good to spread nuclear weapons around the world.”³⁵⁹

Reed and Stillman also described Nixon’s duplicity on nuclear weapons. As a presidential candidate, he opposed the NPT. As president, he sent the treaty to the Senate for ratification. After ratification, he issued a secret decision memorandum on national security telling federal authorities to refrain from supporting the treaty, i.e., they should not urge other nations to sign it. Kissinger and Nixon apparently felt that most regional powers would develop nuclear weapons, that it was useless to try to stop them, and that American interests would be served because the U.S. would not have to supply a nuclear umbrella to protect them all.³⁶⁰

Not all senior officials in the Nixon Administration encouraged the development of nuclear weapons by Israel. Secretary of Defense Melvin Laird later wrote to Secretary of State Rogers, National Security Advisor Kissinger and DCI Helms expressing his conviction that the introduction of nuclear weapons into the Middle East was “not in the United States’ interests and should, if at all possible be stopped.”³⁶¹ Laird was particularly concerned with export licenses issued for two CDC-6400 and one IBM-360/65 mainframe computers to be shipped to Israel. He said David Packard, the cofounder of Hewlett-Packard who was then serving as Deputy Secretary of Defense, had a similar concern. The computers cited by Laird were then being used in the United States to design nuclear weapons and their delivery systems.

On February 12, 1969, Hoover wrote to a person whose name was later redacted, but probably Richard Helms, concerning the Shapiro case and saying, “The Bureau is giving consideration to further action in this case including preparation of a summary report on the subject’s activities [two lines redacted]. It would be appreciated if the above request is given expeditious attention.”³⁶²

On February 14, just two days after telling Helms he was preparing a summary report, and only four days after promising the attorney general to get the information on Shapiro for the president, Hoover sent top-secret memoranda summarizing FBI’s investigations of Shapiro to Secretary of State Rogers, Attorney General Mitchell and National Security Advisor Kissinger.³⁶³ Hoover also sent the report to the Director of the Secret Service because it “concerns an individual who is believed to be covered by the agreement between the FBI and Secret Service concerning Presidential protection... .”³⁶⁴

That same day, an assistant attorney general asked Hoover, on behalf of Mitchell, about Shapiro’s contacts with commissioners and staff of AEC.³⁶⁵ Hoover replied four days later that FBI had not developed any information of that sort. He added that the Bureau had advised AEC of the current interests of the president and the attorney general in such contacts (thereby warning the perpetrators, if there were any). He also told the assistant attorney general that the Bureau and AEC were interested in obtaining a decision from the Justice Department about possible prosecution of Shapiro.³⁶⁶

The FBI staff summarized its investigation of Shapiro on February 18. The 56-page report noted the following facts in a one and a half-page summary:

- FBI’s 1965 investigation led to the Justice Department’s conclusion that Shapiro was not subject to registration under the Foreign Agents Registration Act;
- Shapiro currently holds an AEC Q clearance and an Air Force Secret clearance;
- Substandard security conditions at NUMEC were reported by employees and others;
- No logical explanation exists for large losses of nuclear materials at NUMEC;

- Shapiro met at his home with Hermoni and ten other men with special skills and knowledge in scientific and technical fields necessary for Israel;
- Shapiro had been in contact with Colonel Avraham Eylonie regarding uses and sales of plutonium-238 for foreign and domestic buyers;
- Shapiro and his wife attended dinner at Israeli embassy on November 26, 1968 with Israeli Defense Minister [Moshe Dayan];
- Shapiro visited Israel from November 28 to December 12, 1968;
- Members of Israeli Internal Security Service visited Shapiro at NUMEC plant;
- Shapiro was interested in pro-Israeli Zionist causes;
- Shapiro expressed belief that Israel's cause was worth fighting for and he may settle there in a few years; and
- Shapiro's close friend David Luzer Lowenthal [redacted] a frequent visitor to Israel.

The body of the report recounted Shapiro's education and employment from birth through 1968. It also listed Shapiro and NUMEC's foreign business dealings. Several pages of the report were completely redacted when released in 2009 pursuant to an FOIA request. The report included brief biographies of the members of the NUMEC board of directors. In covering Shapiro's foreign travels, the report noted that during the previous seven years he had visited Israel approximately three or four times a year. The FBI noted AEC's report that Shapiro had visited numerous AEC facilities and "has had continuing access to sensitive data at those facilities since at least 1949." The report included summaries of numerous FBI interviews with NUMEC employees, several of whom said they could not explain the missing uranium.

The report contained the names, expertise and affiliations of the ten men who met on November 3, 1968 with Hermoni in Shapiro's home. All but three of the names remained redacted in FBI's response to the 2009 FOIA request. The report reviewed other salient information from the wiretaps on Shapiro's home phone, including Shapiro's potential opportunity to take over Allied Chemical Company's stalled construction project in Israel. Shapiro had said on October 23, 1968, "the main product of the facility, if it is constructed, would be 60-100 tons of uranium annually... ." Shapiro had also said he would meet with the Allied Chemical people in Israel during his November 1968 visit. The wiretaps also disclosed Shapiro's interest in speaking to Moshe Dayan to discuss image intensifier tubes [used in night vision devices whose technology was in a state of change at that time]. In an ironic twist to Shapiro's various statements about immigrating to Israel, the wiretaps captured his November 8, 1968 statement "that he is of more value to Israel if he continues to reside in the United States where Israel's problems can be more readily resolved."

This FBI summary report did not tie Shapiro's trip to Israel in November 1968 to

the Plumbat uranium that arrived there at about the same time. Nor did it show any understanding of the significance of Shapiro's visit to the Allied Chemical facility for converting yellowcake to uranium hexafluoride, a precursor for fuel manufacturing for Dimona. Nor did the agents question why Israel, with no plans to build nuclear power plants, would need 60 to 100 tons of uranium per year. The FBI should have known of these material and relevant factors.

Hoover transmitted the summary report to AEC's director of security on February 18 by a letter stating, "This report summarizes the results of our investigation concerning Shapiro. Our investigation is substantially completed... . You are requested to advise as expeditiously as possible what action will be taken by the AEC with respect to the current security clearances of Shapiro and the classified contracts held by the Nuclear Materials and Equipment Corporation."³⁶⁷

In two of his memoirs, AEC Chairman Seaborg discussed that FBI letter and the summary FBI report. He said, based on his personal notes at the time, "an officer of a certain industrial nuclear facility may have diverted appreciable amounts of uranium-235 to Israel over the last several years. This possibility has apparently been brought to the attention of the president." Seaborg said that the FBI strongly suggested revocation of Shapiro's security clearance and cancellation of NUMEC's classified contracts. He also said Hoover made it clear that the suspected offenses included not only diversion of material but also divulging of classified information to representatives of Israel. Oddly, Seaborg claims that Hoover did not name the person (Shapiro) or the company (NUMEC) in the transmittal letter.³⁶⁸ That is incorrect; both are named in the documents released by the Bureau to Shapiro's coauthor, Benjamin Loeb. Loeb was an economist who joined the AEC staff in the mid 1950s and worked as a writer and editor. He transferred to NRC after AEC was abolished. After his retirement from the NRC staff in 1976, he and Seaborg coauthored three books.

This was not Seaborg's only factual misstep in describing the NUMEC affair. He later wrote a biographical sketch for the Lawrence Hall of Science that he helped to found.³⁶⁹ Having served as AEC chairman for three presidential administrations, Seaborg described Shapiro in veiled terms, as follows.

If "vigor" was the watchword of the Kennedy [era], and "compassion" that of Johnson's, "toughness" was the hallmark of the Nixon regime. We had to be tough, I heard over and over again from chief of staff H.R. Haldeman on down, and I suspect I wasn't nearly tough enough... . I certainly didn't share the above-the-law attitude that culminated in the Watergate scandal. Based on flimsy and implausible evidence from one of their favorite methods—a wiretap—an AEC contractor was accused of diverting plutonium to Israel's nuclear program... . Attorney General John Mitchell insisted the AEC ignore its own regulations and cancel the contractor's security clearance without a hearing. I refused and stalled for time until I found a way to defuse the situation... . It was increasingly difficult to defend administration policies that I disagreed with, and when my commitment ended in 1971, I returned to Berkeley with relief.

No one accused Shapiro of diverting plutonium. Even though his memory was poor, Seaborg maintained his support of Shapiro.

The same day that Hoover wrote to AEC to transmit the report of the Bureau's investigation of Shapiro, an internal FBI memorandum indicated continuing interest by the White House, the Justice Department and the Bureau in the relationship between Shapiro and the AEC Commissioners and staff.³⁷⁰ It said, in part,

Riley [director of AEC security division] was advised (1) of the President and Attorney General's interest in this matter, (2) [redacted], and (3) that Bureau has kept AEC advised on continuing basis of FBI investigation of Shapiro. Mr. Riley was asked what action AEC planned with respect to the classified contracts and clearance held by Shapiro... . Riley further stated that AEC was waiting for a final report from the FBI together with a decision by the Justice Department as to possible prosecution... . With respect to our inquiries, this investigation is for practical purposes completed... . There does not appear to be any basis at this point for the Justice Department to initiate prosecution of subject although substantial information is available to support AEC administrative action against Shapiro as a security risk... .

By letter 2/14/69 Assistant Attorney General J. Walter Yeagley, Internal Security Division, referred to prior recent FBI memoranda sent to the Attorney General on Shapiro. Yeagley pointed out Attorney General desired any additional information available regarding subject's past and present connections with AEC and in particular extent of his contacts with members of commission or other AEC personnel.

Our investigation has not developed any information as to any unusual, improper, or contacts of a strictly personal nature between Shapiro and AEC personnel... . Although prosecution does not appear feasible, in view of AEC's comments as to the possibility of prosecution, we are requesting [Justice] Department's opinion on this score for the record.

A separate internal FBI memorandum written the same day noted, "in view of his activities, Shapiro has been placed on the Security Index." The Security Index was FBI's secret list of persons to be arrested without warrant and detained in the event of a national security emergency. The maintenance of such lists by FBI was controversial in the past and remains so.³⁷¹

The flurry of communications in early 1969 in response to President Nixon's interest in NUMEC appears to have caused a bureaucratic scramble. The FBI did not have enough useful information on Shapiro to recommend his prosecution; Justice hated to tell the president that it thought Shapiro's actions were suspicious but did not have enough evidence to prosecute; and AEC commissioners were unwilling to admit the possibility of a diversion on their watch.

John Fialka reported that Attorney General John Mitchell wrote to CIA in 1969 that

he was closing the case because the Justice Department had no legal grounds “to hang its hat on.” However, FBI sources told Fialka, surveillance of Shapiro continued in 1969 but without a wiretap.³⁷² Fialka’s sources were wrong. Records of the FBI demonstrate the presence of wiretaps through much of 1969 and included a “Justification for Continuation of Technical or Microphone Surveillance” dated August 28, 1969. That memorandum said that three phone lines into “the personal residence of Shapiro” were tapped and had been tapped since September 1968.³⁷³ It also said,

Since the submission of last [report], this source [wiretap] has furnished pertinent information pertaining to subject’s activities, the majority of which would not otherwise be available to this office. Subject continues his contacts with representatives of the Israeli scientific, technical and economic fields, including [redacted], Science Attaché, Dr. Avraham Hermoni, Scientific Counselor, both of the Embassy of Israel, Washington, D.C.; [redacted] Research Metallurgist, Israel AEC; and [redacted] Israel Investment Services, Israel Government Investment Authority, New York City. In view of the continued interest in subject on the part of the United States AEC as evidenced by that Agency’s recent interview of subject and the current tension in the Mid East concerning which this source [wiretap] could supply intelligence data of value to the internal security of this country, it is recommended that this installation be continued for at least an additional three-month period and as long as file security can be assured. If, at the conclusion of the three-month period, information of value has not been obtained from the source appropriate recommendations will be submitted to discontinue this installation.

The FBI records from 1969 are a hodgepodge. Some are highly redacted; some show AEC dragging its feet in deciding on a proper course of action, some report continuing physical surveillance of Shapiro and some show communication between the Bureau and the Justice Department. Then there is the strange case of “Dr. X.”

In late February, FBI noted two articles in a local newspaper called *The Advertiser*, published in southern Allegheny County, which is suburban Pittsburgh. The longer of the two articles was attributed to a staff writer named Mack Track and was captioned “Middle East ‘Powder Keg’ May Be Fissionable-Type if Israel Loses Friends.” The article reviewed the American and French deals with Israel on military aircraft and said that the press does not pay attention when things are done to Israel but is enraged when Israel retaliates. The article then asked, “But the big question mark is nuclear. Will Israel, which certainly has the know-how and facilities to do it, build a hydrogen bomb? ... It’s pretty certain that Israel doesn’t want to go the nuclear route. However, time is against the Israelis and they know it.”

The second article was in a small box adjacent to the first article. Entitled “Dr. X,” it read, “Once or twice a month at Greater Pittsburgh airport a Pittsburgh physicist takes off for JFK International Airport where he boards an El Al plane for Tel Aviv. Dr. ‘X’ is one of the nation’s best informed men on nuclear materials. He once worked for Westinghouse

at Bettis until he and a few others left to start a business for themselves. Now he's a 'consultant' to several Israeli firms and the government on handling radioactive materials and related matters."³⁷⁴

The FBI took these newspaper articles seriously and issued a report in May of its "investigation to ascertain the identity of Dr. X." The report mentioned that confidential sources were consulted. It was sent to Secret Service, among others.³⁷⁵

In its investigation, the FBI interviewed Richard L. Barnes, publisher of *The Advertiser*, people who knew of his credit situation, the local chief of police, representatives of the company that owned *The Advertiser* and Barnes' former employer at another local newspaper. The FBI learned that Barnes was "aggressive, energetic and ambitious" but not disloyal, and that *The Advertiser* was a cheap production, a shopping guide and a legitimate operation of benefit to the community. The FBI learned that an associate of Barnes, Frank K. Noll, had written the two articles of interest and claimed he had gotten the information about Israel from *Life* magazine. He acknowledged to the agent that Dr. X was Dr. Zalman Shapiro. He claimed he met Shapiro on an airplane bound for Israel in 1962 and Shapiro told him about NUMEC's interest in developing food irradiators for sale in Israel and Shapiro's credentials as a metallurgist and former Westinghouse employee. Noll said he recalled all this information in 1969 upon reading an article in *Life* and decided to write something provocative to promote sales of *The Advertiser*.

The FBI agent doing the fieldwork in 1969 might not have appreciated the fact that in 1962 Noll learned about Shapiro's intentions in Israel, or his cover story, whichever is correct, before either the AEC or the FBI. Perhaps Shapiro was testing his elevator speech with an anonymous seatmate on an overnight flight to Israel.

On March 28, 1969, the Attorney General approved continuation of electronic surveillance of Shapiro for another three months.³⁷⁶

AEC Chairman Seaborg resisted FBI's recommendation in February 1969 to cancel Shapiro's security clearance and NUMEC's classified contracts. Seaborg wrote to Attorney General Mitchell in April saying AEC could not just cancel the clearance and the contracts without telling Shapiro why. In addition, Seaborg said AEC had to use the derogatory information that FBI had provided if Shapiro requested a hearing to contest the cancellation of his security clearance. To do so would be to admit to the Bureau's use of warrantless wiretaps, which Justice was averse to do. Instead, Seaborg suggested that AEC interview Shapiro. Although Seaborg thought Mitchell would resist this course, on April 23 he received the attorney general's blessing to go ahead with the interview.³⁷⁷

The interview did not happen right away because of scheduling difficulties. However, Shapiro and Seaborg managed to fit a private, one-on-one meeting into their calendars just a scant two weeks later, ostensibly concerning other matters. According to AEC's Director of Security, Seaborg and Shapiro met on May 6, 1969 and discussed NUMEC's contracts with AEC, not the ongoing FBI investigation.³⁷⁸ Perhaps Seaborg

was too much scientist and not enough public administrator to realize that the appearance of a conflict of interest can be as damaging to credibility as an actual conflict of interest.

Meanwhile, FBI wiretap data showed Shapiro continued to be in contact with Israeli intelligence and atomic energy officials and to express his willingness “to help that country in any way he can.” The wiretaps disclosed “the possible identity of a ‘friend’ at AEC” and recorded continued interactions between Shapiro and Avraham Eylonie of Israeli Military Intelligence.³⁷⁹ There were other lengthy FBI reports of wiretap information later in 1969.

The wiretaps disclosed a May 2 conversation between Shapiro and an undisclosed individual at Israeli Investment Services, an arm of the Israeli Government Investment Authority in New York City. In the conversation, it appeared that Shapiro was chafing under the management of NUMEC’s new owner, ARCO. “Subject [Shapiro] indicated he wanted to go to Israel in June 1969, in spite of the fact his employers wanted him to visit Europe on Company business. Subject stated that he was tempted to tell his employers to ‘go to hell.’ [Redacted] discouraged subject from taking this [course] of action by informing subject that he was too valuable in his present position with NUMEC.”³⁸⁰

At about the same time, the Joint Committee showed renewed interest in the NUMEC case. On May 13, Assistant Attorney General Yeagley and AEC Security Director Riley briefed JCAE Chairman Holifield, Staff Executive Director Edward Bauser and Deputy Director George Murphy on how communications to the committee on the NUMEC matter should go forward in the future. Yeagley said, “It would not be possible to produce the FBI reports for their [Joint Committee] examination principally because of the sensitive sources and investigative techniques usually involved in such an investigation.”³⁸¹ In addition, the records disclosed the existence of FBI’s warrantless wiretaps and must have contained information about CIA and the investigative techniques it employed in Israel because there were many redactions.

On June 20, Shapiro met Jeruham Kafkafi of the Israeli embassy at the Pittsburgh airport. Kafkafi left Washington by air early that day, met with Shapiro for about an hour and returned directly to Washington. The FBI observed the meeting in secret.³⁸² Kafkafi has been described variously as a Mossad case officer (*katsa*), who ran agents in America, and a “possible Israeli intelligence officer.”³⁸³

On June 25, high-level officials met in Washington to discuss whether to interview Shapiro. Attendees included Peter Flanagan, assistant to President Nixon, Clay Whitehead, assistant to Flanagan, Seaborg and Riley. On June 30, Whitehead told AEC to go ahead with the interview.³⁸⁴

On July 19, Henry Kissinger wrote to President Nixon to spell out alternatives for addressing the status of the Israeli nuclear program. A special group comprised of Kissinger, David Packard from Defense, Richard Helms from CIA, Elliott Richardson

from Justice and General Earle Wheeler, Chairman of the Joint Chiefs of Staff, was convened to address the topic. Kissinger noted that the Israelis would have 10 surface-to-air missiles programmed for nuclear warheads by the end of 1970. He explained that the Israelis were interpreting their promise to not be the first to introduce nuclear weapons into the Middle East as meaning “they could possess such weapons as long as they did not test, deploy or make them public.” The special group wanted the administration, in upcoming discussions with Yitzhak Rabin and Golda Meir, to obtain Israel’s commitment to sign the NPT and to not possess nuclear weapons.³⁸⁵ Kissinger apparently changed his mind since his earlier agreement with Nixon to not push other nations to sign the NPT. Kissinger’s special group also told the President,

There is circumstantial evidence that some fissionable material available for Israel’s weapons development was illegally obtained from the United States by about 1965... . This is one program on which the Israelis have persistently deceived us—and may even have stolen from us.

Finally, four months after Attorney General Mitchell gave the go ahead, William Riley at AEC told the FBI that he had contacted Shapiro and arranged an interview for August 14, 1969 in Washington. Riley said Shapiro did not question the reason for the interview.³⁸⁶ On August 28, Riley sent Hoover a summary of AEC’s interview of Shapiro.^{387,18}

The summary of the “Informal Interview” is nine pages long and has an additional two-page attachment describing a follow-up interview by telephone on August 26. The follow-up interview was “in specific reference to the information he had provided ... concerning the circumstances of his meeting at the Pittsburgh airport on June 20, 1969, with Jeruham Kafkafi.” The two summaries were signed by Franklin N. Parks, AEC Office of the General Counsel, and William T. Riley, Director, AEC Division of Security, who conducted the interviews.

The summaries contain several notable points and omissions. First, they provide a detailed account by Shapiro of his interaction with Avraham Hermoni, scientific counselor of the Israeli embassy, and “a number of U.S. technical and scientific personnel” in the November 3, 1968 meeting arranged by “a scientist from the University of Cornell, a member of the physics department ... (Benjamin Morton Siegel).”³⁸⁸ An intermediary in setting up the meeting in Shapiro’s residence was a University of Pittsburgh professor (Jerome Laib Rosenberg).³⁸⁹ Shapiro said the “general tone of the meeting concerned ways and means the group could be of assistance to Israel in solving some of its technical problems.” Shapiro listed the areas in which Israel sought assistance from him and the other scientists, i.e., water contamination, saboteur detection, long-life power sources and military activities.

The interviewers also reported, “In response to a question, [Shapiro] said he did not know why Hermoni had not requested information on these topics from the U.S. military.” Shapiro said he thought he met Hermoni for the first time in Israel and he thought Hermoni was a professor at a university, not an employee of the Israeli Ministry of

Defense. He also “said that when Colonel Hillel Aldag, Hermoni’s predecessor, was transferred he [Shapiro] was invited to a reception at the Israeli embassy to meet Hermoni at which time he renewed his acquaintance with him.”

Shapiro told his AEC interviewers that he met Jeruham Kafkafi, a subordinate of Hermoni, “about a half dozen times.” The interviewers reported that Shapiro was “calm throughout the entire interview except when pressed for the details of his meeting with Kafkafi on June 20 at the Pittsburgh airport.” In fact, Shapiro did not remember the meeting (it occurred two months before the interview) until prompted by his AEC questioner and then said he and Kafkafi talked about an overdue invoice and a “power supply unit and whether or not it could be adapted to the Israeli intrusion detection device.” They also discussed “difficulties they had been encountering in the potato irradiation project.” Shapiro’s demeanor in this area of questioning prompted the follow-up telephone call by Riley and Parks on August 26.

The AEC interviewers told Shapiro at the start of the interview that it resulted from questions that arose in a routine investigation by AEC to continue Shapiro’s security clearance. Shapiro said he viewed this interview as “related to the losses of material at NUMEC in 1965 and the fact that the staff of the JCAE had indicated he had probably carried the unaccounted-for material to Israel presumably for use in the Israeli weapons program.” Shapiro “expressed his concern that his company as a result of process losses of materials in 1965 has been blackballed and that recently NUMEC had been denied a contract in the safeguards area that it had expected to receive.” The interviewers responded, “that insofar as the losses of material at the NUMEC plant were concerned, the Commission had conducted a complete investigation and that this matter was closed.” Either the interviewers lied or, more likely, they did not know of the ongoing FBI investigation that CIA requested after it found HEU near Dimona.

The interview summaries twice repeated Shapiro’s statement that “he has never been requested to furnish classified information, has never furnished classified information and would not, if asked to, furnish classified information to unauthorized personnel.” The interviewers noted that Shapiro made this statement in the specific context of his associations with Israeli officials. The interview summaries included no mention of the restrictions on transfer of sensitive nuclear technology compared to the restrictions that apply to classified information.

Riley concluded, “On the basis of the information developed during this interview, particularly Dr. Shapiro’s statement that throughout his associations with Israeli officials he has never been asked to furnish classified information, has never furnished, and would not, if asked to, furnish such to unauthorized persons, the Commission does not contemplate further action in this matter at this time.” The interview summary touched on the following additional points:

- When asked about his foreign contacts, Shapiro listed many and named Israel as “one of his foremost customers.”
- Shapiro discussed ISORAD’s slowly developing irradiation projects and the possible use of a 5-watt nuclear generator to supply power for intrusion detection devices in Israel.

- Shapiro admitted meeting a number of Israeli “national officials” and said that several of them had visited his facility under authorization of the AEC.
- Shapiro “pointed out the only classified work NUMEC has had is in producing Navy fuel and he has had no Navy fuel work for years.”
- Shapiro said “he has cooperated with other government officials, including [redacted short acronym] which according to Shapiro frequently [two lines redacted].”

It is possible that Shapiro was alluding to CIA when he told Riley and Parks that he had cooperated with a federal agency. Years after the interview, *Newsweek* reported, “Zalman Shapiro’s foreign connections—which often had made him a valuable source to the CIA itself—brought him under suspicion.”³⁹⁰

Riley and Parks recorded at the end of their summary of the first interview that Shapiro was calm except when confronted with the AEC’s knowledge of his recent airport meeting with Kafkafi. They also said he was less than candid in describing the circumstances of the November 3, 1968 meeting in his home with the other scientists and Hermoni. They implied they believed his statements about never furnishing classified information to the Israelis. On August 26, 1969, twelve days after the interview, they called Shapiro to inquire further into his airport meeting with Kafkafi. They told him that the reasons he had given for the meeting did not appear to justify flying from DC to Pittsburgh to meet in person. Shapiro said there also had been some discussion of the political situation in Israel but that the reason was the long-overdue \$32,000 owed by Israel to NUMEC. He told Riley and Parks “the account was settled shortly thereafter.”

On September 8, Shapiro called Riley to say he had been mulling over the August 26 telephone conversation and, since the AEC attached some significance to the airport meeting, he had given more careful thought to it. “The only additional detail he wanted to include in his general statement was that Hermoni (the AEC memo of conversation refers to Hermoni when it presumably means Kafkafi) asked him if he knew an individual from Oak Ridge, whose name he (Shapiro) has since forgotten, but whom he understood from the general line of questions asked by Hermoni was a nuclear physicist and was to participate in an inspection of facilities in Israel.” Shapiro said he told Hermoni, “that he did not know this individual and thus was in no position to comment.”³⁹¹ Neither an overdue invoice nor a reference check on an Oak Ridge physicist appear to justify a round trip flight from Washington to Pittsburgh for a one hour meeting. Perhaps there was something else to justify the time and expense compared to a phone call, such as a subject that the Israeli spies did not want to discuss on a phone line that was tapped.

The FBI never asked Kafkafi for his version of why he went to Pittsburgh to meet Shapiro at the airport. However, Avner Cohen did ask Kafkafi many years later.³⁹²

Around 2011 or so, I went to visit an old neighbor, the very old Yerucham Kafkafi, who by that time was already living in a nursing home in Kfar Saba. For decades the Kafkafi family lived on my street, about five houses away from my parent’s house in Ramat Hasharon. Indeed, as a child I was very close to one of the sons, Amnon, who was

a year younger than me, so I knew his parents. By the time of my visit, Yerucham was 94 years of age (if I recall correctly). I sensed this was the last time to ask him about NUMEC and about that airport meeting, which I subsequently learned about. Kafkafi, still with good cognition and memory, understood immediately my question. He told me that the meeting at the Pittsburgh airport was about payments for those nuclear batteries that NUMEC delivered to Israel, with permission, but Israel was late to pay. He elaborated that it was a long overdue payment that Israel had owed NUMEC, and that Shapiro was impatient about it for a while, so they decided at the embassy that given their long and close relationship with Shapiro, it was worthwhile to fly and hand him the payment in person.

Two weeks after AEC's interview of Shapiro, Seaborg wrote letters to the Justice Department, the FBI and the Joint Committee to summarize what AEC learned. He indicated,

- Shapiro's account of a particular meeting with an Israeli official was consistent with other reports AEC received of the meeting,
- Shapiro appeared to be less than completely candid in the discussion of his relationship with some officials of the Government of Israel... . He was vague and uncertain as to details that he should have been able to recall, and
- Shapiro stated that he had never been asked to furnish, had never furnished and would not furnish classified information to Israeli officials.

Seaborg concluded the AEC did "not contemplate further action in this matter at this time."³⁹³

Seaborg and his staff did not address the fact that some types of technology transfer are prohibited even if they do not involve classified information. The Atomic Energy Act required AEC to approve in advance any transfer of "sensitive nuclear technology" to other nations. That term is defined as any information that is not available to the public that is important to a uranium enrichment facility, a nuclear fuel reprocessing facility, or a heavy water production facility. Sensitive nuclear technology can take a tangible form, such as models, prototypes, blueprints or operations manuals, or an intangible form, such as technical services. Apparently, Riley and Parks did not distinguish between classified information and sensitive nuclear technology in their 1969 interview of Shapiro. Unauthorized disclosure of either type of information to a foreign state was a violation of the Atomic Energy Act.

Riley later said more about the 1969 interview than was recorded in the interview summary. In a May 1979 FBI interview, Riley recalled that Shapiro expressed respect and admiration for Israel, said American and Israeli interests were one and the same, and said if he helped Israel he would be helping the United States. Shapiro also told Riley that he would like to immigrate to Israel someday.³⁹⁴ It is intriguing that Riley waited ten years to tell the FBI of these important parts of the 1969 interview.

Several things are remarkable about Shapiro's statements as they were recalled by

Riley but not reported by Seaborg or included in the summary of the interview. For one thing, Shapiro appeared to think that anything he did to help an American ally was okay. To the contrary, the Atomic Energy Act does not differentiate between friend and foe in setting rules that govern the transfer of sensitive nuclear technology. The test for espionage is whether the unsanctioned transfer of information could injure the United States or assist another country in development of nuclear weapons. For another thing, by saying that he would like to immigrate to Israel someday, Shapiro conceded a conflict of interest in his protection of nuclear technology.

Riley summarized the Shapiro interview in a letter to Hoover on August 28, 1969.³⁹⁵ Hoover replied to Riley on September 3.³⁹⁶ Hoover said in his response the Bureau had conducted a

thorough and extended investigation ... [that] developed information clearly pointing to Shapiro's pronounced pro-Israeli sympathies... . It is believed most unlikely that further investigation will develop any stronger facts in connection with the subject's association with Israeli officials. The basis of the security risk posed by the subject lies in his continuing access to sensitive information and material and it is believed the only effective way to counter this risk would be to preclude Shapiro from such access, specifically by terminating his classified contracts and lifting his security clearances.

Seaborg quoted from this letter in one of his memoirs, saying Hoover strongly implied AEC was making a mistake in not revoking Shapiro's security clearance.³⁹⁷

Hoover wrote to Helms the same day he wrote to Riley. The Gerald R. Ford Presidential Library first released a redacted copy of Hoover's letter in March 2009.³⁹⁸ The ISCAP released a less redacted version of the letter in 2014.³⁹⁹ Hoover's letter to Helms was very similar to his letter on the same day to Riley. It read in part as follows:

As you are aware, this Bureau has been conducting an investigation of Dr. Zalman Mordecai Shapiro, head of the nuclear processing firm, NUMEC, Apollo, Pennsylvania, since May 1968. Copies of reports covering our inquiries, including a summary report prepared by our Pittsburgh Office under date of February 18, 1969, have been furnished to your Agency on a continuing basis.... .

We have conducted a thorough and extended investigation of Shapiro for more than a year, including substantial physical surveillance coverage. We have developed information clearly pointing to Shapiro's pronounced Israeli sympathies [one and a half lines redacted]. It is believed most unlikely that further investigation will develop any stronger facts in connection with the subject's association [half line redacted]. The basis of the security risk posed by the subject lies in his continuing access to sensitive information and material and it is believed that the only effective way to counter this risk would be to

preclude Shapiro from such access, specifically by terminating his classified contracts and lifting his security clearances. However, after careful consideration, including an interview with Shapiro, AEC has advised that it plans no further action at this time. Under these circumstances, we are discontinuing our active investigation of the subject.

Both AEC and FBI decided at that point to discontinue further action regarding Shapiro. Seaborg provided his simple justification for not going further. “The FBI still gave us no evidence; harboring pro-Israeli sympathies and meeting with Israelis were still legal activities, as far as I could ascertain.”⁴⁰⁰

AEC’s Director of Security William Riley soon replied to Hoover.⁴⁰¹

We are, of course, fully aware of the extensive effort on the part of the Bureau in this case. The investigation, however, did not produce evidence which would provide AEC a sufficient basis either to revoke Dr. Shapiro’s security clearances under our established personnel clearance procedures or to bar him from further classified contract activity... . In this regard, the Attorney General, in his letter to the Chairman, AEC, on April 4, 1969, advised that the Department has no evidence which would support any action by the Department.

On September 8, 1969 DCI Helms wrote a three-page memorandum for President Nixon.⁴⁰² The CIA released the memo in September 2015 in connection with an FOIA lawsuit and redacted all but the first five lines of the memo. Those lines said the information was being provided to the President and the Secretaries of State and Defense personally. Helms sent the memo soon after receiving Hoover’s memo signaling an end to FBI’s investigation and just before a visit by Golda Meir to the United States for a meeting with President Nixon. The memo did double duty when it came to informing presidents: According to notes on the copy released by CIA, DCI William Colby had the memo retyped for President Ford on August 20, 1974.

On September 19, 1969 in preparation for Meir’s visit, the State Department prepared a briefing book for Kissinger and Nixon on “Israel’s Nuclear Weapon and Missile Program.”⁴⁰³ The department noted, “It has been the consensus for some time that the acquisition by Israel of nuclear weapons would be seriously counter to our worldwide interests.” The department went on to suggest ways that Kissinger or Nixon might say to Meir that the United States frowned on the whole idea. Imbedded in the suggestions was a short summary of what the Department knew about the status of the Israeli nuclear program.

Israel has the technical ability and material resources, including unsafeguarded uranium, under her control to produce weapons grade material for a number of weapons. All the facilities required for production of plutonium have been identified with the exception of the

separation plant. Israel may also have acquired highly enriched U-235, possibly through development of a small gas centrifuge separation capability. Some have reservations about whether or not Israel has produced and assembled a complete nuclear weapon, but do not dispute the likelihood that she could and soon might; others feel confident that Israel has one or more nuclear weapons now. The first such weapon would probably be in an air-drop configuration, so that Israel might very well now have a nuclear bomb.

The September 1969 meeting between President Nixon and Prime Minister Meir marked the end of Washington's political pressure on the Israeli nuclear program. There is no written record of their private discussion; even Henry Kissinger was excluded from the meeting. In all likelihood, Meir informed Nixon that Israel had acquired the bomb and pledged to keep it invisible, i.e., untested and undeclared. In exchange, Nixon agreed to stop asking for annual visits to Dimona and to stop badgering Israel to sign the NPT.⁴⁰⁴ Israel's policy on its nuclear arms became known as nuclear opacity. The United States has remained a willing coconspirator in that deception for nearly 40 years, which undermines its credibility.



Richard Nixon and Golda Meir

In the words of Avner Cohen, “Set against contemporary values of transparency and accountability, the Nixon-Meir deal of 1969 is now a striking and burdensome anomaly... . It is time for a new deal to replace the old Nixon-Meir understandings of 1969, with Israel telling the truth and in doing so finally normalizing its nuclear affairs.”⁴⁰⁵

The relationship between FBI and CIA reached its nadir when liaison officer Papich resigned in March 1970 and urged Hoover to redouble FBI's efforts to cooperate with CIA. On March 2, Hoover sent a secret Teletype to FBI field offices in cities where CIA maintained a presence. “IMMEDIATELY DISCONTINUE ALL CONTACT WITH THE LOCAL CIA OFFICE.” Hoover's knee jerk reaction did not succeed. His G-men and CIA officers were too good at clandestine operations; they simply continued to cooperate as best they could behind the director's back.⁴⁰⁶

On March 5, 1970, Helms issued a National Intelligence Estimate concerning Soviet policies in the Middle East. He noted that Soviet calculations surely took into account the fact that Israel had the capability to develop and produce and might soon be in a position to deploy nuclear weapons. He surmised the Soviets would believe that Israel primarily relied on such weapons as a deterrent against Arab invasion, only to be used if Israel faced a desperate situation.⁴⁰⁷

¹⁸ In FBI's release of this document in the mid 1980s, it completely redacted the interview summary. In December 1989, CIA responded to an FOIA request from the NRDC and provided 35 documents relating to NUMEC, including a letter from AEC Assistant General Manager Howard Brown, Jr. to Richard Helms transmitting a mostly unredacted copy of Riley's summary of the Shapiro interview. In 2008, in response to my FOIA request, while I was unaware of the NRDC documents, CIA refused to acknowledge that it had a copy of Riley's letter. Separately, in 2008 CIA also refused to declassify a copy of the same letter that resides in James Connor's files in the Gerald R. Ford Presidential Library. How or why CIA refused to declassify a document it refused to acknowledge it had is a mystery. In any event, in 2008, Tom Cochran provided me the NRDC's mostly unredacted copy. Then, in 2009, in response to my FOIA request, FBI provided another essentially unredacted copy of the interview, which was attached to an August 28, 1969 letter from Riley to Hoover. Curiously, FBI redacted the names of the AEC lawyer and Kafkafi.

Chapter 10

Quixotic Quest (1970)

Undeterred by Hoover's relentless surveillance and relieved of NUMEC's debt by its sale to ARCO, in October 1970 Shapiro left NUMEC and joined Kawecky Berylco Industries. KBI was formed by the October 1968 merger of two smaller companies, Kawecky Chemical Company that produced fluoride salts near Boyertown, Pennsylvania and The Beryllium Corporation located in Reading, Pennsylvania. Among other specialty metals, KBI processed beryllium, an important metal used in atom bombs, either as a reflector to increase explosive yield without increasing weight and size or, in more rudimentary weapons, as a neutron source at the center of an implosion. After he accepted the new position, Shapiro requested an elevated AEC security clearance, called a Sigma clearance, in addition to his Q clearance, so that he could do nuclear-weapons-related work for his new employer. KBI had contracts related to nuclear weapons with an AEC office in New Mexico.⁴⁰⁸

On October 14, the AEC commissioners met in executive session to discuss Shapiro's request for a higher clearance. After the meeting, Seaborg recorded in his daily diary, "This is a very difficult situation and we will have Security staff discuss it with him with a view of possibly having a Security Board review, a method of procedure which I inherently deplore. We will also check with the White House to get their views."⁴⁰⁹

On October 29, John F. Doherty, the acting head of the Internal Security Division of the Department of Justice, wrote to the FBI Director to transmit a "Security Statement" prepared by the AEC with respect to Zalman Shapiro.⁴¹⁰ Doherty noted,

Subject is now employed by Kawecky Berylco Industries, Inc., which has available all current and advanced [nuclear] weapons concepts and techniques related to beryllium weapons components. The proposed Security Statement charges that subject has "knowingly established an association with individuals reliably reported as suspected of espionage" and that subject has "engaged in conduct which tends to show that subject may be subject to influence or pressure which may cause him to act contrary to the best interests of national security."

The transmittal letter attached an eight-page Security Statement that included a list of numbered points that supported these overarching concerns. The items were drafted as admissions that AEC intended Shapiro to sign. The transmittal letter asked the Bureau to, "Advise whether any individuals are currently available to testify at an AEC Personnel Security Board hearing to any of the information set forth in the lettered paragraphs of the proposed Security Statement." When it first released this document in the mid 1980s, FBI completely redacted the proposed eight-page Security Statement and the paragraph in the cover letter setting forth the overarching charges against Shapiro. When released again in 2009, pursuant to another FOIA request, most of the redactions had been eliminated except for six lines elaborating on the affairs of David L. Lowenthal, two lines related to the purported request by the Israeli intelligence operatives in 1968 for information about electricity generators powered by Pu-238 and three lines related to ISORAD.

Consistent with the idea of a Personnel Security Board hearing, William Riley and

Sid Kingsley, a lawyer from AEC's office of general counsel, met with Shapiro on October 30 to advise him that his security clearance was under reconsideration because of the increased access to classified information that he would have at Kaweck Berylco. They informed him that the commission might use its administrative review procedures to resolve his application for clearance, i.e., his case might involve a public hearing. Shapiro left the impression with Riley that he would fight his case in such a hearing and said he had informed Kaweck Berylco of his past clearance problems. Shapiro said his problems "all stem from the Joint Committee ... [where some] staff members ... still believe that he had shipped special nuclear material to Israel." Riley advised that he had told the commission of Shapiro's claim that he had not passed classified information to unauthorized people, but that he also told the commission, "Dr. Shapiro had been less than candid in clarifying the derogatory implications, particularly the airport incident." Shapiro "mentioned that Atlantic-Richfield [ARCO] had given ISORAD, the NUMEC-based company in Israel, to the Israeli company ... because of Atlantic-Richfield's relations with the Arabs in oil rights. He also indicated that he still plans to live in Israel."⁴¹¹

On November 3, Seaborg called Attorney General John Mitchell to discuss Shapiro's clearance request and to update Mitchell on the latest developments in the case. Seaborg said the commission had drafted a letter to Shapiro saying that a hearing would be held. The commission was prepared to send the letter, "provided Justice would be willing to release the information contained in the FBI reports; without the FBI information, a meaningful hearing could not be developed ... alternatively, we could grant him clearance, but keep close surveillance of his activities involving the weapons aspects."⁴¹² Mitchell said he would look into the matter. About this time, Seaborg also proposed to grant the clearance if Shapiro would swear an oath he had not passed sensitive information to any unauthorized person in the past and would not do so in the future.¹⁹

The following month, Riley told the commissioners at a luncheon meeting in their private dining room in Germantown that Mitchell and the White House "perhaps involving Henry Kissinger and even the President" had decided that the clearance should be denied without offering a hearing. Seaborg recorded in his diary, "This causes some consternation among the Commissioners because this will be the first instance in which such an action has been taken in the history of the Atomic Energy Commission."⁴¹³ In the meantime, the AEC continued Shapiro's Q clearance while it decided what to do about the Sigma clearance.

At this point, Seaborg and his fellow commissioners faced a dilemma. Under AEC's rules, they could not deny Shapiro's clearance application without a hearing unless they found grounds to deny a hearing, which was unthinkable at the time because of the public reaction to the Oppenheimer affair. If they held a hearing, they could not consider the warrantless FBI surveillance information or the strong opposition in the White House and the Justice Department to granting of the clearance.

On December 11, Shapiro called Riley to ask if the commission had reached a conclusion in his case since the two of them had spoken about the matter on November 27. Shapiro said he had hired a lawyer but would not begin legal action against the AEC unless and until the commissioners denied his request for the Sigma clearance. He said he was prepared to advise the commission in writing that he had no intention to immigrate to

Israel at this time. He advised Riley that he had asked Avraham Hermoni to speak on his behalf before any hearing that might be held on his clearance request. In addition, Shapiro said that his Israeli contacts had received information from a foreign government that a former AEC commissioner had suggested that he, Shapiro, was involved in diversion of materials to the Israelis. Riley told Shapiro he would be in touch in the near future.⁴¹⁴

On January 21, 1971, Seaborg, Riley and AEC General Counsel Joseph F. Hennessey met with Attorney General Mitchell and Assistant Attorney General Robert Mardian in Mitchell's office. Seaborg described his views on the case, i.e., the charges against Shapiro "were essentially without substance... . I strongly opposed denying a clearance without going through the hearing process ... it had never been done before by any other government agency." Mitchell said the charges against Shapiro "were serious enough so that the man should not have access to sensitive weapons information and he thought the case should be settled by the courts." Seaborg's rejoinder was that there would be sensational publicity associated with a hearing because Edward Bennett Williams was defending Shapiro and they intended to "put up a public fight in order to vindicate the man's honor." The meeting ended with Mitchell's suggestion that Seaborg discuss the matter further with Secretary of State Rogers and National Security Advisor Kissinger.⁴¹⁵

Shapiro's new attorney, Edward Bennett Williams, was a well-known and successful Washington trial attorney who owned several professional sports teams. He represented such high profile clients as Frank Costello, Hugh Hefner, Jimmy Hoffa, Joseph McCarthy and Frank Sinatra. Williams later represented Richard Helms when he was charged with lying to Congress. DCI Helms was an occasional guest in Williams' box seats at the Washington Redskins' home games.⁴¹⁶ Evan Thomas, his biographer, observed, "Williams would defend anyone, he liked to say, as long as the client gave him total control of the case and paid up front. He would represent Mafia dons and pornographers for enormous fees. He would also represent priests, judges, and attractive women in distress for little or nothing."⁴¹⁷

On January 25, Seaborg, Riley and Hennessey met with National Security Advisor Henry Kissinger and his assistant David Young in the White House. Seaborg reviewed the background of the Shapiro case, said the charges of diverting material were false and said he had briefed Attorney General Mitchell and Secretary of State Rogers. Seaborg told Kissinger that "scientists all over the country would be up in arms" if AEC denied Shapiro's clearance request without holding a public hearing. Kissinger and Seaborg agreed to meet with Rogers and Mitchell to further address the clearance question in the near future. Seaborg had lunch in the White House dining room that same day with the president's science advisor, Edward E. David. He told David that AEC commissioners and staff were "unanimous in opposing the proposed procedure." David was sympathetic to Seaborg's point of view and offered to talk to Mitchell about the matter, if necessary.⁴¹⁸

The commissioners grew so desperate to find a way out of the clearance dilemma that on January 28, they directed AEC General Manager Robert Hollingsworth to find Shapiro another job.⁴¹⁹ It is clear now that Seaborg and his fellow commissioners went to extremes to protect Shapiro's interests. Shapiro had made choices about his friends, his affiliations and his job; his actions were called into question because of those choices; the government could not let him do a certain kind of work because of those questions; so, the

government opted to find him another job. Even in America, where the relationship between politics and science often goes awry, one could not hope to get such a deal without friends in high places.

In February, David told the Justice Department that Shapiro “probably already has all the information necessary to make a simple nuclear weapon and thus it would be a mistake to drive him out of this country as a result of unfair treatment in the clearance process.”⁴²⁰ David was probably right. To incentivize AEC to find favorably on his clearance application, Shapiro said he did not intend to immigrate to Israel at this time. However, if his application was denied, Shapiro could always change his mind. Surely, notoriety would be attached to Shapiro’s immigration to Israel if his clearance were denied.

On February 18, Seaborg and Howard Brown had lunch with Helms in his private dining room on the seventh floor of CIA headquarters in Langley, Virginia. Seaborg described the impasse that had developed between AEC and Mardian of the Justice Department over Shapiro’s clearance request and emphasized his view that Shapiro “did not divert enriched uranium in the episode of a few years ago.” Helms told them he had no information about Shapiro that had not already been given to them. On a related subject, Seaborg urged Helms to “not become too concerned about cases of alleged leaking” of information about laser-induced controlled nuclear fusion to Israel.⁴²¹

A week later, Seaborg and Justice agreed to tell Shapiro’s attorney that Justice was opposed to granting a Sigma clearance to Shapiro. On further reflection, AEC demurred by cancelling a scheduled meeting with Shapiro’s attorney without telling him of the Justice Department’s involvement in the case.⁴²²

On March 5, AEC Commissioners James Ramey and Clarence Larson met with the chairman, president and vice-president of KBI “to discuss possible solutions to the clearance problem that has been plaguing us.” The commissioners failed to convince KBI to change Shapiro’s job assignment; however they agreed to continue to extend his Q clearance while they continued to address his request for a Sigma clearance.⁴²³

While AEC and Justice deadlocked over Shapiro’s clearance request, AEC staff continued to hound him. On March 11, Riley informed Hoover that Shapiro, while working at KBI since July 20, 1970, had twice requested classified information for which he was not cleared. Riley told Hoover, “The AEC has not authorized KBI to grant Dr. Shapiro access to AEC classified information.”⁴²⁴ Hoover wrote back to Riley on March 16 to acknowledge that Shapiro, “without benefit of AEC clearance had been making inquiries regarding a classified AEC project.”²⁰ The FBI retained Shapiro on its Security Index because of this infraction.⁴²⁵

The commissioners then reverted to the option of finding Shapiro another job. Unwilling to meet with him directly, they asked Frank Cotter, Westinghouse vice president and head of its Washington office, to meet with Shapiro to seek a way out of the dilemma. Instead, Cotter asked John Simpson, president of Westinghouse Power Systems, to offer Shapiro a job, which Simpson did on or about April 1. The job was senior technical advisor at a salary of \$60,000 a year. Cotter also had a discussion with Shapiro where, according to Seaborg, Shapiro may first have learned of the full scope of difficulties he

faced in upgrading his security clearance. Shapiro accepted Simpson's offer soon after the Cotter discussion, and two weeks later withdrew his application for the Sigma clearance.⁴²⁶ On June 1, Shapiro wrote to AEC Commissioner Ramey to say he was pleased with his new job and to express his gratitude for Ramey's "convincing me that in this case it was better to switch than fight."⁴²⁷

On October 10, 1971, Edward Bennett Williams told Seaborg of his satisfaction with the manner in which Seaborg handled the case. Seaborg said there was more to the case than Williams knew and he would reveal more details someday. Seaborg also noted, "Williams told me that Bill Kilmer is a much better team leader for the Redskins than Sonny Jurgenson even though he is not as good a passer."⁴²⁸

On May 2, 1972, seven years after reaching FBI's mandatory retirement age, J. Edgar Hoover died of heart failure, thus ending an unparalleled 48-year term in the same Federal office. His body lay in state in the Capitol where he was accorded full military honors. Hoover served eight presidents, and his tenure as director included gangster wars, prohibition, the great depression, World War II, the Korean War, the Cold War and the Vietnam War. He worked with eight DCIs.

On June 17, five men broke into Democratic National Committee Headquarters in the Watergate complex in downtown Washington, DC. Local police arrested them. The FBI later found that the five burglars were working for President Nixon's staff and that former OSS and CIA operative E. Howard Hunt helped plan the break-in.

Congressional and media investigations of the break-in revealed a range of abuses, including campaign fraud, political espionage and sabotage, other illegal break-ins, improper tax audits, illegal wiretapping and a secret slush fund to help pay for it all. After two years of mounting evidence against the president and his staff, investigators uncovered a secret tape recording system in Nixon's offices. The tapes provided evidence that six days after the break-in, Nixon and his staff conspired to cover it up. With the secret recording system cranking away, Nixon ordered his assistant H. R. Haldeman to tell CIA to tell FBI to back off its investigation. Haldeman did as he was told, but Helms refused to comply.⁴²⁹

Less than a year later, there was a changing of the guard at CIA. Helms had earned the president's animosity by refusing to be part of the Watergate coverup. In early 1973, Nixon staffer John Dean again suggested that CIA intervene in FBI's investigation to take the heat off Nixon. Helms again refused to go along with the shenanigans. Nixon fired him on February 2, 1973, less than two months short of his sixtieth birthday and CIA's mandatory retirement age. Haldeman told Helms after the fact that Nixon forgot his promise that Helms could stay on until retirement.⁴³⁰

That same day, Nixon nominated Helms to be ambassador to Iran. During Helms' confirmation hearings in 1973, Senator Stuart Symington (D-MO) questioned him on CIA's role in the attempted subversion of Salvador Allende's government in Chile. The operations in Chile were still secret, and Helms chose to lie rather than ask for an executive session of the committee. He denied that CIA had aided Allende's opposition.

Subsequent investigations by Congress proved the lie. In 1977, Helms pled *nolo contendere* on the advice of his friend and attorney Edward Bennett Williams and his confidant Clark Clifford. The Federal judge sentenced Helms to two years in jail and a \$2,000 fine. The sentence was suspended and friends from CIA paid the fine.

Dr. James Schlesinger was Helms' successor as DCI. Schlesinger was a Harvard-educated economist and a classmate of Henry Kissinger. He served as Assistant Director of the Bureau of the Budget from 1969 to 1971 and Chairman of the Atomic Energy Commission from 1971 to 1973. While at the budget bureau, Schlesinger led a three-month study for the Nixon administration that recommended the DCI assume a stronger leadership role in the intelligence community. Schlesinger surmised that the clandestine service was at the heart of CIA's problem, consequently, "I'm going to bust it up," he told the London chief of station.⁴³¹

Schlesinger served as DCI for five months. Besides demonstrating a stronger leadership role for the DCI, he reorganized and reduced staff by getting rid of dead wood and moving slots from clandestine operations to coordination of the intelligence community. He had taken a similar tack at AEC to shake up and improve its regulatory program. In retrospect, his time at CIA was not long enough for him to accomplish anything important and was short enough to avoid getting into serious trouble. In July 1973, at the age of 44, he moved on to become Secretary of Defense during Nixon's last year as president.

On June 7, 1973, President Nixon nominated a lawyer, Clarence M. Kelley, to be the director of FBI. Kelley had joined FBI as a Special Agent in 1940 and served in a variety of field offices, including Birmingham and Memphis where he was Special Agent in Charge. He retired from FBI in 1961 to become Chief of Police in Kansas City, Missouri. When he rejoined FBI in 1973, Kelley was the first person to become director through the normal process of presidential nomination and senate confirmation. He brought new thinking to the Bureau, including several steps to improve its relationship with CIA, such as naming a new FBI liaison officer William Cregar.⁴³²

In early 1974, Dr. David Rosenbaum led a Special Safeguards Study for the Regulatory Staff of the AEC. Rosenbaum recruited William C. Sullivan, former deputy director of FBI, to serve on the study group.²¹ Rosenbaum selected Robert M. Jefferson of Sandia National Laboratory to serve as the study's radioactive materials handling expert, along with the chair of the mathematics department at Massachusetts Institute of Technology, Dr. Daniel J. Kleitman. The group inspected a number of licensed nuclear facilities, including several nuclear power plants and the Apollo plant. They found that AEC and its contractors did not guard weapons-grade nuclear materials well enough to successfully resist theft by terrorist groups. The group concluded, "The potential harm to the public from the explosion of an illicitly made nuclear weapon is greater than that from any plausible power plant accident, including one that involves a core meltdown."⁴³³ The

internal report of the study group leaked to the press and served to increase attention that Congress and the executive branch paid to the possibility of foreign states or sub-national organizations stealing weapons-grade uranium or plutonium within the United States to fabricate nuclear weapons. The NRC and DOE increased their safeguards against this possibility over the next several years.

In the summer of 1974, Congress passed the Energy Reorganization Act to eliminate the conflict of interest caused by AEC's charter to both promote and regulate atomic energy. The Act disbanded AEC and replaced it with two new agencies, NRC and ERDA. All of AEC's work related to nuclear weapons transferred to ERDA. The NRC inherited AEC's regulatory responsibilities.

That same summer, the Judiciary Committee of the House of Representatives used a taped conversation between Nixon and Haldeman as the primary basis for the first article of impeachment of the president—obstruction of justice and “endeavoring to misuse the Central Intelligence Agency, an agency of the United States.” Nixon resigned on August 9, 1974 and Gerald Ford became president.⁴³⁴

On September 4, 1974, the CIA issued a Special National Intelligence Estimate, SNIE 4-1-74, “Prospects for Further Proliferation of Nuclear Weapons.”⁴³⁵ In the estimate, CIA said, “We believe that Israel has already produced nuclear weapons... . Our judgment is based on Israeli acquisition of uranium, partly by clandestine means; the ambiguous nature of Israeli efforts in the field of uranium enrichment; and Israel's large investment in a costly missile system designed to accommodate nuclear warheads.”

The 1974 Estimate disclosed that CIA had told three commissioners of the AEC of its conclusion that Israel had stolen uranium for its bomb. CIA did not expect Israelis “to provide confirmation of widespread suspicions of their capability, either by nuclear testing or by threats of use, short of a grave threat to the nation's existence.” CIA said it was

theoretically possible for a country capable of developing a nuclear weapon to do so covertly up to the test of a first device, and a test is not absolutely necessary... . A country capable of developing and producing its own nuclear device is highly unlikely to steal weapons, but one might seek fissionable materials by theft or diversion. Competently done, diversion might go undetected.

This highly guarded conclusion of the CIA was never intended for public disclosure, but it managed to avoid that fate for only four years before CIA committed an embarrassing FOIA *faux pas* by releasing the Estimate to the public in nearly unredacted form.⁴³⁶ It was the most definitive government statement ever made public in the United States about Israeli nuclear weapons capabilities. The Natural Resources Defense Council (NRDC) made the FOIA request. A classification review of the Estimate by CIA staff identified two paragraphs that were fit for release. Instead, the public release included the entire document but for those two paragraphs.⁴³⁷ As in other instances, CIA admitted error

in disclosing classified information but did not deny its accuracy.

In late 1974, William Colby, Schlesinger's successor as DCI, decided it was time for James Angleton to retire. Angleton's severe anti-communist invectives were disturbing people in high places who were promoting *detente* with the Soviets, and his suspicions of a spy in every closet were driving the Soviet division of the Agency crazy. Angleton refused to go, so Colby decided to blame him for CIA's past violations of its charter. Colby invited journalist Seymour Hersh, who had been reporting on illegal CIA surveillances, to a private meeting where he told Hersh about two of CIA's most secret programs—the CHAOS program that assembled files on American political activists and the mail-opening program to discover and monitor Americans engaged in espionage. Angleton participated in both of these covert programs, both were illegal and both were conducted in the United States outside of CIA's authorized charter. Colby also provided Hersh with evidence of other illegal activities that Angleton had undertaken in his capacity as director of counterintelligence. Angleton resigned on Christmas Eve, 1974, two days after Hersh's story appeared on page one of the *New York Times*. Hersh wrote several newspaper accounts of what he called CIA's "Family Jewels" based on the information Colby provided.⁴³⁸

The Family Jewels were assembled in 1973 at Schlesinger's direction. He tasked CIA staff to assemble a list of acts committed by the Agency in the past that "might be construed to be outside the legislative charter" of the Agency. Colby was subordinate to Schlesinger at the time and drafted the order after public disclosure that President Nixon's staff obtained assistance from CIA without the DCI's knowledge.

After disclosing some of the Family Jewels to Hersh, Colby briefed President Ford.⁴³⁹ Colby later told the attorney general⁴⁴⁰ about eighteen items that he had reported to the president. Colby's list did not include NUMEC or anything remotely connected. If CIA had participated in a diversion of highly enriched uranium at Apollo, the act would have been within the scope of Schlesinger's request that CIA staff identify its embarrassing misdeeds. That is, the NUMEC affair, if it involved CIA covert action in the United States, would have been delicate information with flap potential because it would have been an act committed outside of CIA's "legislative charter." If CIA told the truth, then it did not participate in a diversion from NUMEC.

The fact that news of NUMEC never reached President Ford in connection with the Family Jewels does not mean that CIA did not identify NUMEC when it assembled the list of misdeeds because CIA did not report the full extent of its illegal activities. Pulitzer Prize winner Tom Weiner says that Richard Helms, then ambassador to Iran, told President Ford that if they could not stop Colby from further disclosures, "A lot of dead cats will come out." The example that Helms provided to Kissinger and Ford was the fact that Attorney General Robert Kennedy had personally managed CIA assassination plots against Fidel Castro, a fact that had not been provided to the Warren Commission and had not been disclosed in the Family Jewels.⁴⁴¹

In 2007, CIA released more than 700 pages of documents generated by the self-assessment that led to the identification of the Family Jewels. The 24 megabytes of

documents were text-searchable on the Internet. There is no mention of Apollo, NUMEC, Israel or Zalman Shapiro in that documentation. Despite the fact that many of the 700 pages are completely redacted, it is unlikely that CIA admitted participation in a diversion of HEU from NUMEC. The only item in the Family Jewels that comes close to the circumstances surrounding NUMEC is a mention of CIA funding of AEC laboratories, including Savannah River Laboratory, to develop sampling techniques and devices to detect radionuclides released to the environment from nuclear facilities.⁴⁴² CIA relied on such techniques at Dimona in 1968 when it discovered traces of uniquely enriched uranium from Portsmouth, Ohio.

¹⁹ This time, Seaborg referred to “sensitive” information, not just classified information.

²⁰ This is one of the last correspondences about NUMEC involving Riley. On October 25, 1972, the *Washington Post* carried a story by UPI that the AEC had found no security violations by Riley “who was suspended as director of security after several AEC employees alleged he owed thousands of dollars in personal loans ... used in gambling at race tracks in the Washington area.”

²¹ Hoover fired Sullivan on October 1, 1971 because he flaunted Hoover’s edict against cooperating with the CIA.

Part Four: Need to Know

Chapter 11 Reprise (1976)

In January 1975, soon after the Energy Reorganization Act created the NRC, the Division of Safeguards of the new agency assigned one of its senior engineers, Jim Conran, to assemble a history of safeguards measures applied to special nuclear materials (SNM) in the past.²² His task was part of a larger effort by the division to determine what would constitute adequate protection of SNM in commerce and the NRC-licensed facilities that housed it.

Conran was forty something, six feet tall, sandy haired, dedicated to his work, smart and imbued with the tenacity of a bulldog. He had the requisite Q clearance that permitted access to classified nuclear weapons information and national security information. He started his assignment by digging into the safeguards records that NRC inherited from AEC. Then he went to the Energy Research and Development Administration with the same objective. ERDA had inherited the role and the documents of the former General Manager's side of AEC. In ERDA's files, Conran found reference to a classified file on Zalman Shapiro and NUMEC. ERDA denied him access to the file claiming he had no need to know. He went to his managers at NRC to seek support for his quest, but they refused to intervene on his behalf. Conran became a whistle-blower; he was certain that people were out to punish him for trying to do the right thing and convinced that the national interest required his perseverance. He was right on both counts.²³

Conran was not timid in voicing his concerns as he made his way up the management chain to the director of safeguards, then the director of the office of nuclear materials safety and safeguards, and finally to the offices of the individual commissioners. At each level, he sought the same thing, support for his need to access secret files on NUMEC.

He complained that ERDA was denying access not only to him but also to the entire NRC, and it was not just the secrets about Shapiro and NUMEC that were being withheld, but a variety of other important information, such as the likelihood of success of terrorists in designing clandestine atom bombs. As he became more vocal, and surely more suspicious of people's motives, Conran's technical concerns were intertwined with personnel concerns that grew in proportion to the resistance exhibited by senior management. The whistleblower situation involves a never-ending series of Catch-22s. It is not a nice place.

At the top of his NRC management chain, Conran found an attentive ear in Commissioner Edward Mason who took the matter to NRC Chairman William Anders.⁴⁴³ Anders had exhibited a willingness to apply fresh thinking to nuclear safeguards two years earlier when, as an AEC commissioner and acting chairman, he implemented my suggestion to turn an atom bomb threat in Boston, suspected by everyone to be a hoax, into an unplanned national exercise. The ensuing three days of on-the-job training improved interagency coordination on nuclear threat issues. Others besides Anders appreciated the need for the government to have a plan for handling such events in the future. Three years after the Boston hoax, and two years after Conran blew the whistle, an

assistant attorney general said as much to Senator Abraham Ribicoff (D-CT). “The fact that the specter of a diversion of weapons-grade nuclear material from the NUMEC facility has lingered for 13 years and still remains unresolved should certainly remove any doubts as to the necessity for a coordinated interagency plan of action... .”⁴⁴⁴

As NRC chairman, Anders asked for and received briefings by CIA and ERDA about NUMEC. The briefings occurred in February 1976. The CIA’s Deputy Director for Science and Technology, Carl Duckett, represented the CIA. The Director of ERDA’s Office of Security, Harvey Lyon, briefed the commission on AEC’s earlier investigation of NUMEC. Unfortunately, guided by the ubiquitous “need to know,” no one bothered to tell Conran that the briefings occurred or what the commissioners and senior staff of NRC were told. He was simply left to fret over why he was being denied access to secrets that had a bearing on his assignment. Conran was not alone: The commissioners and senior safeguards staff also failed to tell the NRC’s executive director for operations what they learned in the briefing. The EDO is NRC’s top staff official, responsible for overall management of the agency.

At the time of the briefings, Anders was about to leave NRC to become U.S. Ambassador to Norway. To make certain the information provided to the commission by ERDA and CIA would not be overlooked after he left, and because the matter transcended NRC’s jurisdiction, he told James Connor of the White House staff what he had learned about NUMEC.

Anders served both the AEC and the NRC with well-considered judgments on policy and regulatory matters. His courage was demonstrated before coming to AEC when he piloted the lunar module on Apollo 8, the first flight to circumnavigate the moon. It did so on Christmas Eve in 1968 as the crew read the Bible’s creation story to a spellbound world. A few orbits later, Anders took the first “earthrise” photo from the moon, a photo that has been called the most important environmental photo in history. After serving as U.S. Ambassador to Norway, he led General Electric’s nuclear and aircraft divisions before becoming Chairman and CEO of General Dynamics. Anders is not a frivolous person. He would not have taken CIA’s information about NUMEC to President Ford unless he thought it deserved serious attention.

On February 24, 1976, the same month that ERDA and CIA briefed NRC, Senator Howard Baker (R-TN), Chairman of the Joint Committee, wrote to Attorney General Edward H. Levi to ask for a briefing concerning the “alleged diversion of nuclear material from NUMEC.”⁴⁴⁵

Levi referred Baker’s request to the FBI. The FBI’s office of Congressional affairs contacted George F. Murphy, who had assumed the post of executive director of the Joint Committee and had drafted the letter from Baker to Levi. Murphy advised that Baker’s letter had been purposely vague and that he would like to discuss the matter in detail in his office. Murphy had earlier expressed doubts about the AEC’s leniency with NUMEC, saying that the missing uranium could not have just disappeared.⁴⁴⁶ Now, in the waning days of the Joint Committee, Murphy had the power to satisfy his curiosity. Murphy had served with CIA from 1950 to 1958, was an investigator for the Joint Committee at the

time AEC investigated the 1965 inventory difference at NUMEC, was deputy executive director of the Joint Committee from 1968 to 1975, and then served as executive director from 1975 until the committee disbanded in 1977, pursuant to a Senate reorganization. He went on to become head of the Senate Office of Classified National Security Information.

Murphy met with a special agent of FBI on March 9, 1976, and recounted what he knew about NUMEC in the mid 1960s, noting that the company had paid about \$800,000 that it owed to the government, despite its financial difficulties. In retrospect and reading between the lines, it appears Murphy was suggesting that someone paid the fine for NUMEC. He asked the FBI to brief Senator Baker on March 17. After the March 9 briefing, FBI Director Kelley wrote to Attorney General Levi to say that Murphy had asked FBI to turn over all of its files on Shapiro to the Joint Committee. Kelly said he told Murphy that a memorandum summarizing the FBI material would be provided if the attorney general approved the file transfer.⁴⁴⁷

In “off-the-cuff” remarks in mid-March 1976, just a month after he briefed the NRC, CIA’s Deputy Director for Science and Technology, Carl Duckett, told members of the American Institute of Aeronautics and Astronautics, at a meeting of its local chapter featuring cocktails and a light buffet for \$6.50 a head, that Israel had ten to twenty nuclear weapons. Although the session with high-ranking CIA officials was not classified, CIA asked attendees not to take notes or quote the remarks of the CIA presenters. Nevertheless, one of the people in attendance at the briefing leaked Duckett’s remark about Israel to the press and it soon appeared in the *Washington Post*. The current DCI George H. W. Bush apologized publicly for the disclosure.²⁴ Israel’s foreign minister protested Duckett’s remarks and denied their accuracy in a conversation with U.S. Ambassador Malcolm Toon. Senator Frank Church, then Chair of the Senate Select Committee on Intelligence, called Duckett’s remarks “the biggest goof in the history of leaks.” Church did not say that Duckett erred in his assessment, only that he goofed in leaking it. Although Israel’s policy of nuclear opacity survived Duckett’s career, there was no doubt by the late 1970s that the U.S. was complicit in the ruse.⁴⁴⁸

Time magazine went a bit further in its disclosures following Duckett’s disclosure.⁴⁴⁹ In the April 12, 1976 edition, *Time* published a “Special Report” on how Israel got the bomb that included the following statement:

For years there has been widespread speculation about Israel’s nuclear potential—speculation that has now been confirmed. At a briefing for a group of American space experts in Washington recently, an official of the Central Intelligence Agency estimated that Israel had between ten and 20 nuclear weapons “available for use.” In fact, TIME has learned, Israel possesses a nuclear arsenal of 13 atomic bombs, assembled, stored and ready to be dropped on enemy forces from specially equipped Kfir and Phantom fighters or Jericho missiles. These weapons have a 20-kiloton yield, roughly as powerful as those that obliterated Hiroshima and Nagasaki.

On March 11, 1976, Carl Duckett, perhaps sensing his days at the Agency were limited, wrote a memo to DCI Bush to summarize the NUMEC case.⁴⁵⁰ He attached a Memorandum for the Record dated March 9, 1972, entitled “Possible Diversion of Weapons Grade Nuclear Materials to Israel by Officials of the Nuclear Materials and Equipment Corporation (NUMEC).”⁴⁵¹ Duckett told Bush the 1972 memorandum “was written by (redacted) who originated CIA action on this case and who is available to answer any further questions you may have.” It is highly likely that the author of the 1972 memorandum was John Hadden. Duckett recalled in this 1976 memorandum that former DCI Helms brought the intelligence aspects of the case to the attention of Presidents Johnson and Nixon, Attorney General Clark, Secretaries of State Rusk and Rogers, the Joint Committee, and Henry Kissinger, among others.

Duckett went on to provide Bush a chronology of CIA’s efforts “to persuade the FBI to undertake an investigation of Shapiro and NUMEC and to keep track of its activities in this regard.” The list began with the April 2, 1968 letter from Helms to Clark described above. There were six entries in the list showing that Helms and Hoover did not agree on the course of the FBI investigation. The last item that CIA had received from FBI at that time (1976) was a report that Shapiro requested to be brought up to date on a sensitive project two weeks after joining Kawecki Berylco in July 1971.

Hadden’s seven-page Memorandum for the Record of March 9, 1972 began with a summary of how Congress and the AEC allowed special nuclear material first to be leased and then owned by companies in the private sector. Hadden then summarized the formation and financing of NUMEC, beginning in 1957, including the role of David Lowenthal. CIA redacted approximately six lines of text concerning Lowenthal when it released this document in 2015. The memorandum then summarized the inventory difference that AEC discovered at NUMEC in 1965 and the ensuing investigation. The technical details in Hadden’s memorandum accord with the information developed in this book. The memorandum then turned to “The facts developed to date pertinent to such a possible diversion.” Hadden listed eleven facts. CIA redacted facts 2-5 in their entirety and portions of the others when it released the document. The information that remained in the memorandum that has not already been mentioned above included the fact that Shapiro received a tour of the Suez Canal area by the Israeli Air Force following the 1967 war. In addition, although the facts are highly redacted, Hadden opined that NUMEC might have been conceived as an alternative route to the Israeli bomb from its inception or it might have become a necessity later, “when the existence of the reactor at Dimona was discovered.” In either event, Hadden concluded, “On the basis of the foregoing it must be assumed for the purpose of U.S. national security that diversion of special nuclear materials to Israel by Dr. Shapiro and his associates is a distinct possibility.” Hadden went on to estimate the circumstances of the diversion.

To the best of our knowledge, the strike which gave supervisory personnel free run of the facility pinpoints the time at which material could have been most easily diverted to Israel and the time at which the evidence of such a diversion could best be covered up. Given the state of affairs at NUMEC from 1957 on, a diversion could have occurred at any time, but the period January – February 1964 is certainly the most suspect... . [Transportation] would present no radiation hazard and [the

uranium] could have easily gone by diplomatic pouch or Israeli merchant ship or even El Al Airlines. Transportation of diverted material to Israel would have been a simple matter.

On April 21, 1976, Marcus Rowden succeeded William Anders as Chairman of the NRC.

On April 22, FBI Director Kelly sent the attorney general a four-page summary of FBI's two previous investigations of Shapiro and NUMEC. He said the first investigation was initiated at AEC's request in 1965 and concerned whether Shapiro should have registered as an agent of a foreign government. The summary noted that between the first and second investigations the Bureau learned of the missing uranium at NUMEC and decided not to intervene "under the circumstances presented by AEC." The information surrounding the advent of the second FBI investigation in 1968 was completely redacted from this FBI report. The substantial investment in NUMEC by David Lowenthal's company Apollo Industries is mentioned at the end of the summary, as is Shapiro's being "active in fund raising and bond drives and ... a heavy contributor on behalf of Israel in the United States." The last paragraph of the summary notes that since January 1972 Shapiro had been employed as an assistant in charge of the breeder reactor division at Westinghouse where he held no security clearance.⁴⁵²

Attorney General Levi attached the April 22 FBI report to a memorandum he dispatched that same day to President Ford.⁴⁵³ Under the heading "Possible Violation of Criminal Statutes," Levi said:

The FBI did not conduct an investigation into the alleged discrepancy in nuclear materials at NUMEC because it was advised by the AEC that any loss likely was attributable to inadequate accounting procedures and that there was no evidence or suspicion of a violation of law. Since no investigation was undertaken, the Department of Justice cannot state that there is no evidence which would support a criminal charge. The facts available with respect to this matter indicate that the following criminal statutes may be involved... .

Levi went on to list 10 possible violations of the Atomic Energy Act and criminal statutes. Two of them, unauthorized dealing in special nuclear material and transportation of dangerous articles, suggest the Justice Department's suspicion that enriched uranium was unlawfully removed from the NUMEC facility. The last three crimes listed were accessory after the fact, misprision of felony (that is, concealing knowledge, usually by a government official, of a felony committed by another person) and conspiracy. These violations appear to refer to someone in the federal government. Levi went on to say:

Because the statute of limitations may not have run with respect to any [of the three] offenses that may be involved and because of the responsibility to consider whether any dismissal or other disciplinary proceedings may be appropriate with respect to any persons presently

employed as federal officials who may have participated in or concealed any offense, I believe it necessary to conduct an investigation. Section 2271 of the Atomic Energy Act provides that “the Federal Bureau of Investigation of the Department of Justice shall investigate all alleged or suspected criminal violations” of the Act.

On April 27, Senator John Pastore (D-RI), Senator Baker and Murphy met with two representatives of the Justice Department. They discussed procedures for the Joint Committee to gain access to information available to FBI on Shapiro and NUMEC without FBI turning over all of its files. Senator Baker explained that the reason for urgency on this matter was “a Presidential request.”⁴⁵⁴ President Ford probably made the request of the Joint Committee after he learned of the concerns of NRC Chairman Anders.

That same day, Kelly sent Levi another summary memorandum on Shapiro and NUMEC for Justice Department review before sending it to Murphy. This second summary was five pages long and FBI redacted it in its entirety before releasing it.⁴⁵⁵

Only two days later, FBI was given “oral instructions” in a meeting attended by the attorney general, the FBI director and others to “undertake at once an investigation of matters concerning Shapiro, the Atomic Energy Commission (which by then had become NRC and ERDA) and the possible diversion of special nuclear material. Investigation is to be based on provisions of the Atomic Energy Act and Obstruction of Justice.” The FBI recorded in minutes of this meeting the specific sections of the Act that might pertain, including one relating to an offense that secures an advantage to any foreign nation, one that prohibits transfer of SNM unless authorized by an AEC license, and several relating to the disclosure of restricted data. The minutes also listed the penalties that might accrue for the various charges. The penalties included fines up to \$20,000 and imprisonment for up to 20 years for the alleged violations of the Atomic Energy Act or a fine of up to \$5,000 and imprisonment for up to five years for the obstruction of justice charges. It was noted that the statute of limitations for the Atomic Energy Act violations was 10 years.⁴⁵⁶ These oral instructions by the attorney general apparently resulted from his April 22 letter to President Ford, described above.²⁵

To recap, this was the third FBI investigation of Shapiro. The first investigation concerned his relationships with Israel and the possibility that he should have registered as an agent of a foreign government; the second was initiated at CIA’s request after it concluded Israel obtained an atom bomb faster than anticipated and U.S.-enriched uranium was found near the bomb factory at Dimona. The third investigation concerned both the possibility of a diversion of HEU (a violation of the Atomic Energy Act) and a subsequent coverup (obstruction of justice).

Attorney General Levi launched the third investigation in the last year of the Ford Administration based on the FBI’s summary of the two previous investigations and the concerns expressed by NRC Chairman Anders. Senator Baker said the urgency of the investigation stemmed from the interest expressed by the president. President Ford’s diary shows that he discussed “nuclear safeguards” at a White house meeting on May 7, 1976 with Senator Baker, JCAE Executive Director Murphy, White House counselor John O. Marsh and James Connor, Cabinet and Staff Secretary.⁴⁵⁷



Senator Howard Baker and President Gerald Ford

In formalizing the attorney general's request for a new investigation, the Justice Department told FBI to address "the possibility that current or former government officials, in particular the Atomic Energy Commission, did not take appropriate action to thoroughly resolve allegations against Shapiro, the operations of the NUMEC plant, and the alleged transmittal of restricted data and/or nuclear materials [one-half line redacted]. Your investigation should be closely coordinated with Criminal Division attorneys."⁴⁵⁸ Before then, no one questioned whether AEC officials hindered the earlier investigations. Seaborg may have gone the extra mile in backing Shapiro's quest for a higher security clearance, but Seaborg had not yet published his memoirs supporting Shapiro in the NUMEC affair. The redacted copies of FBI documents do not disclose what particular government official at AEC the attorney general had in mind, if any.

The FBI agents assigned to the new investigation quickly contacted the agents that conducted the prior investigations and set up office space at ERDA to review documents describing AEC's prior dealings with Shapiro and NUMEC. FBI's contact at ERDA was Robert Tharpe, deputy director of the division of safeguards. Early in the new investigation, Tharpe had some difficulty in locating AEC's files on the matter but said he had copies of all NUMEC contracts with AEC and would make them available for review.⁴⁵⁹ Historical records about Apollo had a way of disappearing.

By early May, FBI determined which organizational elements of AEC became part of ERDA and which ones became part of NRC. An FBI agent made contacts with both agencies to tell them of the new investigation and to request access to the files they inherited from AEC. At NRC, the agent contacted the office of inspection and enforcement, the division of safeguards, and Executive Director for Operations Lee Gossick, who identified two individuals [names redacted] that would be most knowledgeable about Shapiro and NUMEC.⁴⁶⁰

The FBI files show that ERDA had recently been supplying information on Shapiro and NUMEC to the Joint Committee and to the White House. In addition, about this time, FBI files show that the Bureau assigned the code name DIVERT to this third investigation

of Shapiro and NUMEC.

The FBI interviewed several NRC managers, including Harold Thornburg, acting deputy director of the Office of Inspection and Enforcement, Kenneth Chapman, director of the Office of Nuclear Material Safety and Safeguards and Ralph G. “Gerry” Page, deputy director of the Division of Safeguards. All claimed their knowledge of the facts was superficial and recommended that FBI interview other NRC staff members that had more direct experience with NUMEC by virtue of their prior employment at AEC.

FBI also interviewed George Murphy of the Joint Committee staff and James Connor, secretary to the cabinet and staff secretary to the president, John Marsh, counselor to the president, and William Hyland, deputy assistant to the president for national security affairs. The White House people said President Ford was aware of and interested in the NUMEC matter and was “particularly concerned with any indication of a prior coverup.” Connor, who was key to raising the matter with the president, was more specific. He told John Fialka “You could look at all the documents and ask yourself whether something had happened here. The answer was probably yes. Then the question was whether you could do anything about it, and the answer was no.”⁴⁶¹

The White House staffers recommended others in the administration that might be able to provide additional information, including Fred Ikle, the president’s National Security Advisor, John Lehman of the Arms Control and Disarmament Agency and Dave Elliott of the National Security Council.⁴⁶² They said the president had discussed the NUMEC matter with Senators Pastore and Baker of the Joint Committee. Marsh noted that Representative John D. Dingell (D-MI), chairman of the House Subcommittee on Energy and Power of the Committee on Interstate and Foreign Commerce, “may suspect diversion of the material involved inasmuch as he has stated that he feels the full story has not come out.” George Murphy suggested no new names for the FBI to interview and provided no direct information about why the Joint Committee had renewed its interest in the case.⁴⁶³

On May 3, 1976, Robert Tharpe of ERDA told the FBI, “when AEC conducted an examination of NUMEC’s performance it was found that the shortage of material experienced by NUMEC over the years and over the span of its contracts was more or less in line with that experienced by other manufacturers under contract to the AEC at that time.” He thus contradicted the statement and data presented by AEC General Manager Hollingsworth ten years earlier in a letter to Joint Committee Executive Director Conway, i.e., the NUMEC losses were about double what one would expect by examining the performance of similar plants.⁴⁶⁴ Tharpe’s statement also contradicted a statement to the FBI in 1979 by Robert Fri, the former acting administrator of ERDA, who recalled “NUMEC had perhaps twice as much recorded loss as other plants doing similar conversions.”⁴⁶⁵ There is no indication in the FBI documents that FBI agents detected or understood these important contradictions.

About the time that FBI was interviewing Tharpe of ERDA, Gerry Page of NRC told the FBI that the losses at NUMEC and a similar fuel processing facility, “were possibly due to the uniqueness of these two plants,” implying the losses at Apollo were higher than other plants of its type.⁴⁶⁶ Perhaps the Justice Department harbored suspicions

of a coverup in light of these contradictions among the government's technical experts.

On May 11, 1976, FBI agents interviewed James Connor, Secretary to the Cabinet and former director of planning and analysis at the AEC (1972-1974).⁴⁶⁷ Connor said his "interest in the NUMEC situation was kindled indirectly by an article which appeared in *Time* magazine about six weeks ago which was titled to the effect 'How the Israelis Got the Bomb.'" He said he was not a technical expert but he knew enough to recognize inconsistencies in the article so he looked into the NUMEC situation. He was "appalled over what he felt was the superficiality of the AEC investigation with regard to NUMEC and Shapiro." For example, he found it curious that in the earlier investigations no one had inquired where NUMEC found the means to pay off the bank loans it took when AEC imposed the fine for losing the uranium associated with the Astronuclear contract. Moreover,

Mr. Connor felt that the AEC interview of Shapiro was not of a penetrating nature and that AEC officials failed to ask a large number of logical questions. Failure to explore Shapiro's contacts with David Lowenthal [one line redacted] puzzled Mr. Connor. Mr. Connor did not understand the ready acceptance by AEC that significant records and material may have been destroyed in a vault fire at NUMEC.... [He] is puzzled why the investigative effort directed at Shapiro and NUMEC seemed suddenly to come to a stop.

On May 13, 1976, FBI agents again interviewed George Murphy.⁴⁶⁸ In reply to a question about whether the Joint Committee had any information whatsoever that would be of assistance to the current investigation, Murphy replied, "You'll have to check with John Mintz at FBI about that." John A. Mintz was then FBI Assistant Director and legal counsel. His name appeared on distribution for some internal FBI documents concerning NUMEC, and there were some documents authored by "Legal Counsel." No record has surfaced of what Murphy might have told Mintz that was different than what he told the FBI agents on May 13. In that interview, Murphy said he had no concrete evidence about any possible diversion of nuclear materials from NUMEC or elsewhere and no knowledge of any interference by anyone that would have limited previous investigations. Thus, one of the most highly placed, long-time doubters of Shapiro's innocence offered nothing concrete to back up his opinions.

On May 14, an FBI Special Agent interviewed John Martin, Acting Deputy Chief of the Internal Security Section in the Criminal Division of the Department of Justice. They discussed the general nature of the documents then in FBI's possession concerning the 1968 investigation of Shapiro and NUMEC. "No communication was observed which specifically qualified the investigative direction to be taken in the FBI's 1968 inquiry to the Shapiro-NUMEC matter. Nor was there observed a copy of the reported correspondence between (line redacted) and the then Attorney General, Ramsey Clark, supposedly dated in early April, 1968."²⁶ Martin advised that he had requested a search to be made through any Ramsey Clark correspondence still maintained by the Department of Justice. The subject correspondence was not located.⁴⁶⁹ Martin stayed on the case for some time. Two years later he headed a three-man task force for the Justice Department "to determine if there is any individual agency in the Government which knew about a

possible violation of the Atomic Energy Act and did nothing about it.”⁴⁷⁰ The memorandum referenced here was signed by “Legal Counsel” and was directed to the FBI Director. Since the Justice Department is in a superior position in the Federal hierarchy to FBI, the phrase “any individual agency” would appear to include CIA and FBI, not just AEC and its successors.

On May 17, FBI interviewed former FBI Assistant Director Charles Brennan who recounted his earlier meeting with James Conran of NRC. Brennan said Conran had identified loopholes in the nuclear security system and was convinced that “forces” at NRC were deliberately covering up reported losses of nuclear materials from facilities under its control. Brennan considered Conran to be sincere “but did not know whether he was paranoid or not.” The interviewing agent noted that an internal investigation of Conran’s allegations was then underway at NRC.⁴⁷¹ The internal NRC investigation conducted by the Conran task force that is described in the following chapter of this book was not initiated until a year after this FBI interview of Conran. The task force did not learn of an earlier internal NRC investigation, if there was one.

Conran later reported to NRC investigators that in November 1975 he met with Chick (sic) Brennan, former director of the domestic intelligence division of FBI who was retired and working as a consultant for MITRE Corporation.⁴⁷² Conran said Brennan brought along “a knowledgeable member of what is generally thought of as the intelligence community.” Conran attributed the new FBI investigation in 1976 to Brennan’s contacts with Congressional sources after that meeting, which, if correct, could explain why the Joint Committee took an interest in the matter before Carl Duckett briefed the NRC in February 1976.

The same day in May 1976 that FBI interviewed Charles Brennan, a staff member at the NSC, David Elliott, wrote a memorandum about NUMEC for his boss, National Security Advisor Brent Scowcroft. Elliott referred to an earlier meeting in Scowcroft’s office with Marcus Rowden of NRC, Robert Fri of ERDA, John Marsh of NSC, James Connor, secretary of the cabinet, and others. In the memorandum, Elliott asked for a two or three-week delay in forwarding to President Ford an NRC report about “those remedial steps that had been taken since the NUMEC incident.”⁴⁷³ General Edward Giller (USAF retired), DOE’s director of military applications, later told DOE investigators that he too attended the March 1976 meeting in Scowcroft’s office that was convened out of Rowden’s concern that some of the younger members of the NRC wanted to “spill the beans,” about Apollo.⁴⁷⁴

On June 1, 1976, Carl Duckett retired from the CIA for reasons of health, or so he said.

On June 15, the special agent in charge of FBI’s Washington Field Office sent a report to FBI Director Kelley to acquaint FBI headquarters personnel, the attorney general and the White House with two prior “extensive” investigative efforts involving NUMEC.⁴⁷⁵ The SAC said,

The President is particularly concerned with indication of a prior coverup. James Connor expressed the feeling that he was appalled at the superficiality of the AEC investigation into this matter. It is also noted that this matter has been on a need-to-know basis at the White House and it is the hope of the White House that instant investigation would not come to the attention of the general public.

The Washington SAC went on to say that an enclosed report appeared to answer the president's concerns and that FBI had neither indication of a coverup nor indication that the prior AEC investigation was superficial. The agent closed by saying that the possibility of public disclosure increased the longer the investigation continued. Attached to the letter was Dr. Sam McDowell's 23-page report, plus 40 pages of attachments, dated April 1966, that described AEC's investigation and independent inventory of Apollo.

On July 26, 1976, Enno Knoche, CIA's deputy director of central intelligence, wrote a memorandum for DCI Bush, about NUMEC.⁴⁷⁶ Knoche noted,

The FBI has completed its passive background review of the case. Their preliminary finding is that while a diversion of nuclear material could have occurred there is no solid evidence that a diversion did occur... . The FBI is now preparing to initiate an active investigation of the case. They have authority from the FBI Associate Director, Mr. Adams, to conduct a no-holds-barred investigation... One of their early interviewees will be Dr. Charles Reichardt, a former AEC official.”⁴⁷⁷

Of particular note in this memorandum, written at the highest level of American intelligence, was a concern that the FBI investigation team leader expressed to Knoche.

[He] informs me that the team feels strongly a need for a briefing on (half line redacted) nuclear energy technical matters... . While the FBI team has some technical background they are not specialists in nuclear energy and know nothing about foreign nuclear energy programs. They have had no hard objective briefing on the possibility of a diversion and related evidence and they understandably feel uneasy at confronting possible hostile witnesses without a proper background surrounding the case.

This would not be the last indication that the FBI was over its head and that the CIA was withholding relevant information.

On August 10, 1976, a five-member team from the FBI's Washington Field office met with three CIA representatives to discuss the NUMEC case.⁴⁷⁸ The purpose was to give the FBI “investigative team a general background briefing (one-half line redacted) and [provide] a technical tutorial on nuclear matters.” The meeting “led into a general discussion in which several of the FBI agents were quite vocal ... the agents had formulated various theories vis-a-vis any diversion.” The CIA redacted the description of the two theories advanced by the FBI agents when it released the document in September 2015. Apparently, the FBI theories rested on the agents' judgment that the stated losses

were consistent with the primitive nature of NUMEC's Apollo plant. "The FBI agents in advancing the foregoing arguments against a diversion evidenced considerable frustration" at the failure to get financial records without a subpoena. The account continues, "Sensing this frustration early in the discussion the CIA participants did not engage in any polemics or spirited argument but presented their evidence, information and views on a very low key basis throughout." The FBI agents "indicated that even if they came up with a case it was extremely unlikely that Justice and State would allow it to come to trial." The author of the memo closed with the thought "In sum they feel they have been given a job to do with none of the tools necessary to do it."

Echoing the frustration of the FBI's investigation team, on August 17, the Special Agent in Charge of the FBI's Washington Field Office wrote a brief memo to FBI Director Kelley saying, "WFO strongly suggests that no further effort be exerted in this matter and that all investigative work cease immediately."⁴⁷⁹ Kelley apparently agreed with the recommendation and wrote to Attorney General Levi two weeks later asking whether further investigation was desired. The memo noted that the Bureau had used a six-man investigation team.⁴⁸⁰

Six weeks later, the deputy assistant attorney general for the criminal division of the Justice Department replied that more investigation was needed and should include persons employed at NUMEC during the pertinent period.⁴⁸¹

President Jimmy Carter was inaugurated in January 1977. As part of the transition of administrations, John Marsh, counsel to President Ford, wrote a two-page memo about the "NUMEC matter" to Carter's incoming Secretary of the Cabinet Jack Watson. Marsh recalled their earlier discussion of NUMEC and certain classified documents that he showed to Watson. Marsh attached a file of those documents to his memo. One of those four documents was Helms' two-page memo to Attorney General Clark on April 2, 1968 asking that FBI's NUMEC investigation be reopened, presumably on the basis that CIA had detected HEU near Dimona. In his memo, Marsh said that Phil Buchen (friend, law partner and Counsel to President Ford) and Ed Schmultz (deputy counsel to President Ford and cochairman of the Domestic Council Review Group on Regulatory Reform) had discussed the NUMEC matter with Bob Lipshutz (counsel to President Carter). Marsh suggested that Watson discuss the matter with Lipshutz. Marsh said he did not know whether the paper that the NSC prepared for President Ford in the spring of 1976 on NUMEC (a paper originated by CIA, ERDA and NRC) ever went to the president. Marsh referred to a paper he prepared for NSC staff on hearings by Congressman Dingell, which might address the NUMEC matter (those hearings occurred later that year).

On January 21, 1977, the day after President Carter's inauguration and Bush's resignation as DCI, Carl Duckett's successor, Deputy Director for Science and Technology Leslie Dirks, sent a handwritten routing slip to the Acting DCI, Enno Knoche, "For your eventual background use if Senator Baker asks to see you after he talks to Atty General. If you find it necessary to give Sen. Baker a paper on the case, DD/S&T will provide something appropriate."⁴⁸² The routing slip probably transmitted Carl Duckett's March 11,

1976 memorandum to DCI Bush described above. If so, it likely included John Hadden's memorandum of March 9, 1972, both of which contained more detail than CIA was willing to release in September 2015, 43 years after Hadden assembled the CIA's assessment of NUMEC's involvement with the Israeli weapons program.

²² To NRC and DOE, the word "safeguards" includes measures for physical security and for material control and accounting that are required of its licensees and contractors to provide reasonable assurance that bomb quantities of SNM, such as plutonium and highly enriched uranium, are not diverted for unauthorized purposes.

²³ By the 1980s, after the Congressional and FBI investigations of NUMEC ended, Conran served on the staff of Victor Stello, NRC's executive director for operations. Conran did well in that assignment, no doubt glad to be relieved of his whistleblower status. Attempts to find him in 2015 were unsuccessful.

²⁴ In November 1975, President Ford reorganized his national security structure. Henry Kissinger became Secretary of State, Brent Scowcroft became National Security Advisor, Schlesinger left his post as Secretary of Defense and Colby left CIA. Richelson reported that Colby's demise owed to his openness with Frank Church's Senate select committee in its investigation of CIA that led to the disclosure of "information that the White House and Kissinger would have preferred remain secret."

²⁵ In June 1967, the Comptroller General reported to the Joint Committee on a GAO review of the NUMEC affair. The GAO concluded at page 5 of its report that Section 222 of the Atomic Energy Act of 1954 would apply to unauthorized transfer of SNM and would require punishment by death or imprisonment for life if such transfer occurred with intent to injure the United States or with intent to secure an advantage to any foreign nation. In 1980, NRC staff reached the same conclusion. (NUREG-0627, p. 15).

²⁶ That correspondence would have been the Helms to Clark memo that requested the Attorney General to begin a new investigation of Shapiro in light of the uranium connected to NUMEC that CIA found in Israel.

Chapter 12

Conran the Whistleblower (1977)

While the third FBI investigation was underway, Jim Conran stoked growing concerns within the NRC as he failed in his attempts to get safeguards officials at ERDA to tell him what they knew. By April 4, 1977, his frustration with and mistrust of bureaucratic secrecy led him to send An Open Letter to the Nuclear Regulatory Commission and separate letters to President Jimmy Carter and Congressman Morris Udall attaching the NRC letter. Udall chaired the Subcommittee on Energy and Environment of the Committee on Interior and Insular Affairs, which oversaw NRC operations for the House of Representatives.

Conran's letter expressed concern that safeguards of bomb-making materials were inadequate because, among other things, they failed to take into account "serious indications that successful diversion of a large quantity of SNM from at least one existing processing facility might already have occurred at some time in the past." He went on to say that reactions of NRC to this possibility and to his other concerns "have been so consistently bewildering and deeply troubling, and so totally out of character for the NRC ... as to suggest that something is indefinably but terribly wrong... . [Such reactions] are consistent with symptoms one would expect to see if a situation existed in which government officials were involved (or culpable) in the theft of SNM... ." If he had been using such tough talk behind the scenes before this time, it is no wonder that the Ford Administration decided a year earlier to take a new look at what AEC did in the past. Ironically, if someone had told Conran about the president's interest in the matter and the renewed FBI investigation, he might not have blown the whistle.

Even though AEC, FBI, CIA and the Joint Committee had worried over the NUMEC affair for years, and AEC had significantly upgraded its requirements for safeguarding strategic quantities of SNM after the alleged theft, the fledgling NRC was compelled to launch its own investigation to test the merit of Conran's allegations.

NRC Chairman Marcus Rowden asked me to head a task force to conduct the investigation. He assigned six other people to the task force—Frank Arsenault, Paul Baker, Mark Elliott, Norman Haller, William Reamer and Bernard Snyder. The task force members came from various offices of NRC, had appropriate security clearances and had experience in nuclear safeguards; however, this was the first time we had worked together. The efforts of the task force spanned about three weeks and included reading reports of past investigations by AEC and interviewing Conran, his managers and peers, and others from NRC and ERDA who knew of the earlier concerns about NUMEC. Conran said he was satisfied with the qualifications and integrity of the task force members, but he insisted that all of its discussions with him be on the record, which was accomplished by hiring a security-cleared court stenographer.

Senior NRC managers told the task force that FBI and CIA were interested in the case. However, they provided no details about the extensive efforts that those two agencies invested in the NUMEC affair before the task force arrived on the scene. Nor did they say that President Ford had initiated a new FBI investigation because of what Duckett told the commissioners in February 1976.

It took the task force a few days to realize that it was making people nervous. Task force members asked hard questions, and outsiders like CIA and ERDA could not predict where the task force might be going because its members were technical people not known in political or intelligence circles. Furthermore, rumors reaching the task force about NUMEC suggested there had been a coverup.

The anxieties of senior managers at NRC and ERDA increased when the national press learned of Conran's letter. The people most in the know were the ones that were most nervous about going on the record about NUMEC. For example, Paul Baker, who worked in the Division of Safeguards, tried to opt out of the task force several times, claiming he had prior knowledge of Conran's efforts and saying he feared reprisals from his management and peers were we to find in Conran's favor.

Reporters were not the only ones to take an interest in the Conran task force. The CIA required that the task force provide a verbal progress report each evening to Bryan Eagle, executive assistant to Chairman Rowden. In retrospect, it is unclear whether this was a CIA requirement or a Rowden requirement, the latter trying to keep the task force under control as he had controlled the AEC team that went to Apollo in 1966. Eagle said he phoned periodic reports on progress of the task force to someone in CIA. We wondered what CIA feared we might find that CIA did not already know. Perhaps the Agency feared leakage to the public and the Congress of the classified things it had told the NRC commissioners and senior staff in February 1976. Whatever the reason, CIA's oversight of the activities of an independent domestic regulatory agency must have been a first, if Eagle really called.

On April 14, CIA Associate Deputy Director for Operations Theodore "Ted" Shackley wrote a memo to CIA's deputy director for central intelligence [Enno Knoche] advising him not to attend a meeting on NUMEC that was scheduled for the next day with the NSC staff.⁴⁸³ Shackley recommended that Knoche not attend the meeting because "a good possibility exists that sources and methods, as well as contradictory intelligence assessments, could become an issue... . The ERDA meeting with Dr. Brzezinski may be concerned with an issue of domestic law enforcement in which CIA has no authority or responsibility." Shackley recommended that CIA brief the NSC staff in private at a later date. He went on to summarize CIA's evidence on the matter, all of which was redacted by CIA when the document was released in September 2015.

Shackley attached to his memo a "talking points paper and a chronology [line redacted] for use by the DDCI should this option [briefing NSC separately] be selected."⁴⁸⁴ The talking points paper and chronology were nine pages long and were mostly redacted when released by CIA. An unredacted statement read, "To provide all of our information to ERDA would release information that has been considered extremely sensitive up till now." Armed with this summary of secret evidence that CIA continues to withhold today, and contrary to Shackley's advice, Knoche went to the meeting. This memo confirmed, once again, that CIA withheld information from ERDA, as it did with the FBI.

On April 15, 1977, nine days after kicking off the Conran task force and without its knowledge, Rowden briefed the NSC staff about NUMEC.⁴⁸⁵ His briefing concerned the pending release of a Strategic Nuclear Material Inventory Difference Report, then scheduled for August 4.^{486, 27} The briefing occurred in National Security Advisor Zbigniew Brzezinski's office and was attended by NSC staffers David Elliott, John Marcum and Jessica Tuchman; ERDA representatives Robert Fri, Major General Alfred Starbird (USA retired and ERDA's head of National Security), and General Giller; and Enno Knoche of the CIA.²⁸

Rowden summarized "what the White House and Mr. Brzezinski should be aware of regarding the NUMEC issue" in light of the pending release of the report that claimed no significant quantities of SNM had ever been stolen or diverted. Fri summarized the NUMEC case and the various investigations conducted by AEC, GAO and FBI. He said AEC had concluded there were "technical reasons which could account for the loss of this material. He noted, however, that there were some special concerns in the Intelligence Community and he invited [Knoche] to say what they were." Knoche's "concerns" were fully redacted from his Memorandum for the Record when released by CIA in September 2015.⁴⁸⁷ No record has been found to show that Rowden relayed the views of Knoche and the CIA to any of the other NRC commissioners. Commissioner Gilinsky, for one, was not told.⁴⁸⁸ Knoche's Memorandum for the Record noted, "[Fri] and Rowden went on to describe the rather agitated state of mind of a current [NRC] employee ... likely to become a subject of controversy... . Later in the same day, during the scheduled DCI Intelligence briefing session with the President, Dr. Brzezinski briefed the history of all of this to the President."

That same day, Anthony A. Lapham, CIA's General Counsel, sent a note on a routing slip to Shackley.

I do not disagree with the proposal to offer a separate briefing to Dr. Brzezinski rather than to participate in the ERDA presentation. But at the same time I think we should review the decision not to discuss our intelligence information with the FBI or ERDA. As I understand it, the investigations of NUMEC are related to the possibility that nuclear material may have been diverted, and apparently at least ERDA has concluded there is no evidence of diversion. However, that conclusion is difficult to square with our intelligence information, and while one can argue about the probative value of that information from an investigative or legal standpoint, I doubt we are in a position to say that it has no value (half line redacted).

The Conran task force did not know of these discussions among NRC, NSC, ERDA and CIA. It only learned by chance remarks of people it interviewed that the NRC commissioners knew more about AEC's prior investigation of NUMEC than the task force had been told. As a result, the task force posed a set of questions concerning what the commissioners knew about prior investigations by CIA, AEC and the Justice Department. In response, the commission sent Bryan Eagle and NRC General Counsel Peter Strauss to

brief the task force. In doing so, the commissioners decided that the task force could not know what they had been told by Justice, CIA and ERDA; it could only know what the commissioners had done after they were told. Despite this hedge by the commission, the task force labored on, searching for a way to say whether the commissioners had addressed the issue raised by Conran.

The task force met with Eagle and Strauss on Saturday April 23 in secure facilities at the commission's H Street offices in Washington. They told the task force that the information to be conveyed was classified as Secret, National Security Information. They said that ERDA and CIA had given separate briefings to the NRC commissioners in February 1976 about the earlier investigations of Shapiro and NUMEC by AEC and CIA, and that the commissioners had generally accepted what they were told. Later, the task force learned that a man named Duckett had provided the CIA briefing.⁴⁸⁹

Eagle and Strauss said that the briefings in 1976 did not include the FBI. The task force knew that FBI had investigated Shapiro years before to determine if he should have registered as an agent of a foreign country. However, the task force did not know that AEC told FBI that the circumstances surrounding the missing HEU discovered in 1965 did not warrant an FBI investigation.⁴⁹⁰ Likewise, the task force did not know that CIA caused a second FBI investigation to begin in 1968 or that the investigation led to FBI Director Hoover's recommendation that AEC cancel NUMEC's classified contracts and Shapiro's security clearance. The task force also was not privy to the episode that occurred during the Nixon administration when the AEC commissioners finessed Shapiro's request for a Sigma clearance to work at Kawecki Berylco by their finding him a new job at Westinghouse. The task force was told in vague terms that there had been a recent FBI investigation and that President Ford had been briefed on the NUMEC situation. The task force was not told that the FBI investigation was still ongoing in parallel with the task force effort and that other NRC staff and the Joint Committee were interacting with the FBI investigators.⁴⁹¹

Either the NRC commissioners judged that the task force did not have a need to know details about FBI's involvement or they too did not know these details. In retrospect, to have not involved NRC with FBI's ongoing investigation was a mistake. For one thing, the FBI investigators did not understand the technical details of the matters they were investigating. Carefully selected and security-cleared subject matter experts from NRC could have helped FBI agents overcome that limitation. In addition, the people who relied on what the task force said in its final report, including the two Congressional committees that were overseeing NRC at the time, probably assumed the task force was informed of what FBI knew. This historical account, at least in part, atones for NRC's mistake—better late than never.

Strauss and Eagle went on to tell the task force that CIA and ERDA briefings of NRC in February 1976 probably occurred because of Conran's efforts. His open letter in 1977 noted that he had meetings with most of the commissioners. Eagle begrudgingly admitted Conran's persistence with the commissioners might have been one of the factors leading to the briefings by CIA and ERDA. Rowden, who was one of the original commissioners of NRC and succeeded Bill Anders as chairman, later agreed with this assessment. He told the FBI that Anders arranged for the February 1976 briefings by CIA

and ERDA and that Conran was making allegations about the importance of the NUMEC information at the time.⁴⁹² Rowden did not share this information with the Conran task force.

In summary, it is clear today that Conran raised the NUMEC issue with the commissioners and others, that Anders and Kennedy arranged for CIA and ERDA briefings and that Anders was concerned by what he heard in the briefings. Since he was about to leave NRC, Anders briefed James Connor, secretary to the cabinet, who informed President Ford who, in turn, initiated new inquiries by Justice, FBI and the Joint Committee.⁴⁹³

Thomas O'Toole of the *Washington Post* said as much, "The matter surfaced again last year [1976] when the Ford White House asked the Energy Research and Development Administration to turn over its files on the case. The White House did so at the suggestion of former Nuclear Regulatory Commission Chairman William Anders who had been briefed by the CIA on its suspicions in the matter."⁴⁹⁴

Strauss and Eagle also told the Conran task force, "These briefings [by ERDA and CIA] raised serious questions, but did not provide conclusive answers. However, the Commission and other senior officials had the benefit of this information in reaching their conclusions on our current safeguards program." Furthermore, the "classification of the briefings was top secret [National Security Information] including unidentified compartmented intelligence classifications." They also said that the commissioners had stopped making unqualified "no evidence" statements about diversions of bomb-making materials after those briefings.⁴⁹⁵

Victor Gilinsky was one of the commissioners that attended the CIA briefing in 1976. More than twenty years after the fact, he recalled, "What Duckett confirmed, to everyone's astonishment, was that the CIA believed that the nuclear explosives in Israel's first several bombs, about 100 kilograms of bomb-grade uranium in all, came from material that was missing at a U.S. naval nuclear fuel plant operated by NUMEC in Apollo, Pennsylvania. NUMEC had exceptionally close and suspicious ties to Israel. The firm's sloppy material accounting could have masked the removal of the bomb-grade uranium."⁴⁹⁶

Kenneth Chapman (Major General, USAF retired), director of the NRC Office of Nuclear Materials Safety and Safeguards, remembered Duckett's remarks quite differently.⁴⁹⁷ Chapman told the Conran task force, "There was no hard evidence described in the briefings by the intelligence community that material either had or had not been stolen in the past."⁴⁹⁸

The task force did not learn of the commissioners' personal impressions of the CIA briefing. However, it surmised from what little it was told that CIA and ERDA held differing views on the matter. That is, ERDA thought that a thorough investigation had been done by AEC, and, although significant quantities of HEU were missing, AEC found no proof of a diversion. Conversely, some other evidence suggested to the CIA that a diversion had occurred. The task force inferred that CIA would not have been involved if the information conveyed to NRC concerned only the earlier AEC investigation. Moreover, since CIA's jurisdiction is outside the U.S., it was reasonable to suppose, as the

task force did at the time, that CIA told NRC about indications from foreign intelligence sources that pointed to the possibility of a diversion. The task force did not know whether such intelligence was human, physical or both.

The task force also did not learn what ERDA disclosed about NUMEC in its briefing of the commission and its senior staff in February 1976. NRC attendees at that meeting later disclosed to another internal NRC investigation that Harvey Lyon of ERDA asserted that his briefing covered all the NUMEC information in ERDA's files. He described AEC's investigation of the missing HEU and its conclusion that there was no diversion. He specifically mentioned "the FBI investigation," Shapiro's foreign associations, the sloppiness of plant operations, NUMEC's payment for the MUF [inventory difference], the continued problems under ARCO ownership and the fact that Apollo was a problem plant.⁴⁹⁹ The DOE representatives did not share such details with the Conran task force.

The task force delivered its final report on Conran's allegations to the NRC commissioners on April 29.⁵⁰⁰ It briefed the commissioners on May 3. The commissioners allowed no other NRC staff members to attend the briefing, not one.

The task force confirmed the validity of some but not all of Conran's concerns. It found no conclusive evidence on the NUMEC matter, although it could not rule out a diversion and it could not prove that one occurred with the information it was provided. At that time, the task force members had no substantive information about FBI investigations, and they were not privy to the information provided by CIA and ERDA briefings, all of which, with the benefit of hindsight, included additional clues as to whether a diversion occurred.

The task force reported what others had said about learning appropriate lessons from studies of the alleged diversion at Apollo and that these lessons had been or were being incorporated into NRC's safeguards program. The task force also pointed out several weaknesses in the nation's safeguarding of bomb-making materials, some of which derived from Conran's concerns, and offered recommendations on how to correct them. Important among the recommendations was the need to specify the size and other characteristics of adversary groups committed to the theft of such materials, i.e., to define credible internal and external threat levels and to adjust those threat levels as circumstances changed with time, including the threat posed by insiders in positions of authority.

On May 9, 1977, two agents of the FBI visited CIA's Associate Deputy Director for Operations Ted Shackley in his Langley office.⁵⁰¹ One supervised the FBI's Criminal Investigation Division in charge of the ongoing NUMEC investigation. Shackley briefed them from a talking paper based on "a recent review of our files." He did not give them a copy of the paper. The agents said they had come up with no hard evidence of a diversion and the material Shackley provided was not new to them. The talking paper was attached to the memo describing the meeting. The CIA redacted about two-thirds of the talking paper upon its release in September 2015.

On May 13, just 10 days after the Conran task force briefed the NRC commissioners, Assistant Attorney General Benjamin Civiletti wrote to FBI Director Kelley stating that his department had no objection to FBI conducting a lie detector test of Shapiro.⁵⁰² Ten days later Kelley directed the Washington Field Office to interview Shapiro and then decide if there should be a polygraph examination.⁵⁰³

On May 25, 1977, Rowden and I took the report of the Conran task force to Congressman Udall's office to brief him and a member of his subcommittee staff, Henry Myers, on its findings and recommendations. Rowden apologized for NRC's delay in giving the report to Udall because of the need for the National Security Council to review it for classification. So much for NRC's independence—CIA monitored the progress of the task force and NSC vetted its report.

I briefed Udall and Myers on the work of the task force. Udall expressed support for our recommendations on how to improve safeguards, but he was not satisfied with our inconclusiveness regarding NUMEC. Rowden told Udall and Myers that CIA briefed NRC about its findings. He also said there were diverse views within NRC, based on CIA's circumstantial evidence, about the possibility of a diversion.⁵⁰⁴ Then, without missing a beat, Rowden told Udall that if he wanted to learn more he should consult with the National Security Council and "talk to Rick," an apparent but uncommon reference to Admiral Rickover.

Rowden's suggestions surprised me because no one told the task force that Rickover or the National Security Council might have information of value to its investigation. It was told only that NSC would review its report for classification and that Rickover had an interest in the Conran allegations and had sent his Assistant Director Robert Brodsky to talk to Chapman soon after the task force was chartered. The task force also knew that Shapiro was no stranger to Rickover having worked at the Navy's Bettis Laboratory before founding NUMEC. Udall did not follow up on Rowden's recommendation to check with Rickover, perhaps missing a chance to learn more about the enrichment of navy fuel.⁵⁰⁵

Rowden's referral of Udall to the NSC is interesting. Today, more is known about the relationship between NRC and NSC than when Conran blew the whistle. Richard Kennedy was one of the first five commissioners of the NRC, beginning his tenure in January 1975. He served on the NSC staff from 1969 to 1974 under the leadership of National Security Advisors Henry Kissinger during the Nixon administration and Brent Scowcroft during the Ford administration. Kennedy told NRC investigators that he requested the CIA briefing provided by Carl Duckett. He also said that the day after he heard Duckett's briefing he told General Scowcroft "that NRC had received the briefing, that at the time of the events there were differing views, that the highest government officials had been informed in 1966 and that it had now surfaced again through the [CIA] briefing." Kennedy "felt that it might be something they [NSC] were interested in."⁵⁰⁶ Kennedy probably had a particular sensitivity to nuclear weapons in Israel in that he was a member of the NSC staff when Kissinger created National Security Memorandum 40, a

formal process to address how the U.S. government should respond to the emergence of a nuclear Israel.⁵⁰⁷

Years later, former NRC Commissioner Victor Gilinsky recalled, “William Colby was DCI until Jan 30, 1976 (at which point Bush senior took over). As I recall, the NRC briefing [by Duckett] took place in February. It was set up I believe while Colby was still at the CIA. I remember Dick Kennedy saying to Bill Anders in a discussion over Conran and the trouble he was making that he would contact Colby to set up a briefing. I think Anders asked if there was any way we could learn the truth, settle this thing once and for all. Kennedy would have known Colby, at least from Kennedy’s tenure as Haig’s right hand man under Kissinger at the NSC.” Since it was possible that Kennedy saw Kissinger’s memo to Nixon saying there was circumstantial evidence the Israelis swiped the HEU, Gilinsky continued, “I assume Kennedy would have expected that the CIA would come in and say there was no theft, regardless of what they really believed. (When Ed Mason complained about someone in DOE lying to him about the story, Kennedy burst out with ‘Don’t you understand, it was his duty to lie to you.’)”⁵⁰⁸ Carl Duckett later told Congressman Udall that Commissioner Kennedy of NRC called in 1976 to invite him to tell the commissioners about NUMEC.

On June 6, Ted Shackley briefed two FBI officials involved in the NUMEC investigation. He described the general basis for CIA’s conclusions about NUMEC’s connection to Israel.⁵⁰⁹ The FBI officials once again said there was nothing new in the briefing and if CIA learned something new to let them know.

On June 27, 1977 two special agents of the FBI interviewed Shapiro in Pittsburgh. They spent the first hour of the interview discussing a “Waiver of Rights” that the agents asked Shapiro to sign. After consulting with his attorney by phone, Shapiro agreed “to be interviewed relative to the Nuclear Materials and Equipment Corporation (NUMEC) and his tenure with NUMEC as its President.” Shapiro said, to his knowledge “there was never any diversion of enriched uranium from the NUMEC facility and he termed the chances of any individual or group of individuals successfully diverting such material as miniscule. He denied emphatically that he was in any way connected with or responsible for any diversion.” He said losses of material in a plant like Apollo were inevitable due to the manufacturing processes involved. He used the Astronuclear contract to illustrate those processes. The agents were apparently unaware that much of the HEU went missing before that contract and involved different material processing steps. Shapiro admitted that NUMEC blended scrap and waste among contracts and, insofar as possible, recovered uranium at the conclusion of “campaigns.” He volunteered that AEC “officials had, in fact, assured him personally that NUMEC MUF [inventory difference] compared favorably with MUF experienced throughout the rest of the industry.” He said he was never responsible or in any way connected with “release of restricted or classified material.” Shapiro also said, “At no time was [he] aware of being in contact with foreign intelligence officers or organizations.” The special agents did not challenge his assertion, apparently unaware of the background or even the names of Hillel Aldag, Avraham

Bendor, Ephraim Biegun, Binyamin Blumberg, Rafi Eitan, Joseph Eyal, Avraham Eylonie, Avraham Hermoni, and Jeruham Kafkafi, all prior contacts of Shapiro and all intelligence officers of Israel, representing at least four different intelligence organizations.⁵¹⁰

About the time of his FBI interview, Shapiro told the *New York Times*, “We operated within rules and regulations. I have been told by responsible officials that our operations were pretty much in the ball park, in the range of other similar facilities.”⁵¹¹ His statement contradicted what AEC, NRC and ERDA officials told Congress over the preceding twelve years about the amount of HEU missing at Apollo compared to other facilities. His statement also contradicts what DOE’s declassified material accountability records later showed, i.e., while he was president of the company, NUMEC’s losses as a percentage of throughput and in absolute value exceeded those of all other U.S. commercial enterprises that ever processed HEU, by a wide margin.⁵¹²

Shapiro’s statement to the *Times* about NUMEC’s losses at Apollo being comparable to other plants of its type contradicted what AEC General Manager Hollingsworth wrote to JCAE Executive Director Conway on February 14, 1966. “NUMEC’s cumulative losses from time of plant start-up in 1957 have been higher than those determined by other companies having comparable operations.” Hollingsworth went on to say that the HEU lost on the WANL contract amounted to 6 percent of the total HEU received by NUMEC on that contract. He also provided Conway with a table of “The total cumulative losses of U-235 expressed as a percent of total cumulative receipts... .” for five commercial companies, including NUMEC. The losses of U-235 by the four other companies ranged from 0.28 to 0.61 percent of receipts and averaged 0.49 percent, while NUMEC’s loss was 1.21 percent.⁵¹³ Furthermore, the Apollo plant preferentially lost HEU over LEU, as mentioned above in connection with the GAO audit in 1966.

This was not the only time Shapiro made overly optimistic statements about operations at Apollo. He was quoted in the *Washington Star* in June 1977 saying that a statement by an anonymous source that NUMEC was “taking material from one batch and using it to account for losses in a prior batch until the losses became too big to cover up anymore” was “utterly ridiculous and totally untrue. Losses are inherent in the fuel fabrication business because of the highly complex process, which uses uranium in solid, gaseous, and liquid chemical forms and which results in a large amount of waste material at each step. If you’re cooking a small thing in a large pot, then you have material that sticks to the pot.”⁵¹⁴ This claim was counter to what AEC found in its 1965/1966 inventory and investigation of the missing uranium at Apollo. Furthermore, Shapiro himself contradicted this statement a week later in his June 27 FBI interview where he said NUMEC blended materials and wastes among contracts. It appears the FBI agents were not attuned sufficiently to nuclear fuels processing to understand the importance of the difference in his statements or they did not read the newspaper. By paying attention to such contradictions, the FBI agents should have been able to probe Shapiro’s statements.

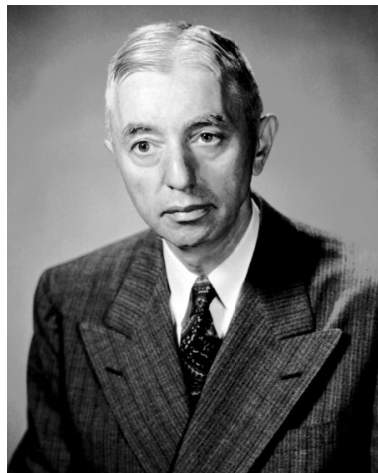
Accordingly, with no one to question them, Shapiro’s statements had their intended effect. On July 21, FBI’s Washington Field Office reported, “In view of the results of this interview [of Shapiro] and all others conducted in this matter, the opinion of WFO remains unaltered ... namely, that the lack of cover up of the NUMEC matter has been adequately demonstrated by the extensive investigations conducted” by AEC and GAO.

“WFO feels that a polygraph examination of Shapiro is unwarranted on the basis of information developed to date. Consequently, this office considers that all logical leads have been covered and is now closing this case.”⁵¹⁵

On July 19, 1977 nearly two months after I briefed Udall on the work of the Conran task force and Rowden suggested he talk to the NSC, Udall wrote to Zbigniew Brzezinski, the president’s national security advisor, seeking a briefing by “appropriate officials.”⁵¹⁶

If Udall had followed up on Rowden’s suggestion to discuss NUMEC with Rickover, he might have received the same reception as the FBI. In May 1979, a hapless FBI agent telephoned “The Admiral” to request an interview to discuss NUMEC. The ensuing exchange, as recorded by the agent, was classic Rickover.⁵¹⁷ The requesting agent was directly connected to the Admiral, who was told that the FBI wished to interview him. The Admiral asked why and when told it related to the NUMEC operation at Apollo, Pennsylvania, he became very agitated.

The Admiral stated that he only knew what had been printed in the newspapers. He demanded to know what questions would be asked so that he could prepare answers. When the requesting agent attempted to set a date and time of interview, Admiral Rickover again shouted that he only knew what he read in the paper and that “I can’t add anything. I have nothing to say.” The admiral, continuing in an agitated state, shouted “You can send a bunch of FBI agents down here and I still won’t have anything to say.”



Admiral Hyman Rickover
Director of Naval Reactors
1949-1981

Although Admiral Rickover never refused to be interviewed by FBI agents, he refused to set a time and date and based upon his behavior, it did not appear that an interview could be arranged. Admiral Rickover was told by the requesting agent that it was clear no interview could be arranged. The admiral said, “Fine.” And forcefully hung the phone up.

Approximately five minutes after ending the first telephone call, the requesting agent received a telephone call from Admiral Rickover's secretary who connected Admiral Rickover to the agent. The admiral, in a calm, rational voice stated, "We sent all that information over to the Department of Energy (DOE) but you (the agent) can come over and review it." The admiral was told that the FBI would like to come over and review any documents available, to which Admiral Rickover retorted "Well, why don't you go over to DOE and look at them." As the admiral was again becoming agitated, it appeared that any further conversation would be fruitless and the conversation was terminated.

The special agent was jinxed: Seaborg also refused his invitation to be interviewed.

Just nine days after Udall asked Brzezinski for a briefing on what the NSC knew about NUMEC, on July 28, 1977, the NSC staff asked CIA for a briefing on "Israel and MUF."⁵¹⁸ The following day, "Ted Shackley called me [John Marcum of the NSC staff] today on a secure line and provided the following responses to our inquiries of yesterday." The next page and a half of the memo documenting what Shackley told Marcum were redacted by ISCAP when the document was released in March 2014. In the last half page of the letter, Marcum went on to say,

I also asked Shackley to get us a rundown on the political aspects—e.g., when were the President and Congressional officials briefed on the Israeli weapons program, on the NUMEC connection, and what were their reactions. In December, Carter was briefed on the NUMEC problem as President-elect by Bush in Georgia. I have also heard sketchy accounts of briefings for Johnson and Nixon, but it would be useful to get these details in hand in case there is a Congressional inquiry later. We should discuss next steps on this issue and the MUF [ID] release. At this point, despite the FBI clean bill of health, I do not think the President has plausible deniability. The CIA case is persuasive, though not conclusive.

Two lines of redaction follow these statements, thus ending the memo.

Chairman Udall held a subcommittee hearing on Conran's complaints on July 29. The Conran task force and the NRC commissioners knew that Udall would explore the NUMEC affair as part of the hearing, in addition to the other matters that Conran had raised in his open letter.

A few weeks before the Udall hearing, Rowden's term as commissioner expired and he left NRC, thus ending a nineteen-year government career with atomic energy law. His departure left the commission without a quorum. The two remaining commissioners were Victor Gilinsky and Richard Kennedy. Under this circumstance, the role of representing the agency at the Udall hearing fell to NRC's Executive Director for Operations, Major General Lee V. Gossick (USAF retired).

Gossick assembled the NRC staffers that were cognizant of NUMEC matters and Conran's other concerns. We met on July 13, 20 and 28 to help him prepare for the Udall hearing. In the course of those meetings, the staff urged him to read a memorandum that the Conran task force had written about the ERDA and CIA briefings of the commission.⁵¹⁹ Reading that memorandum was important because Gossick had not attended the ERDA, CIA and Conran task force briefings.



Major General Lee V. Gossick
U. S. Air Force
1941-1973
NRC Executive Director for Operations
1975-1980

That memorandum was specific about the commission's decision in early 1976 to stop saying there was no evidence of a diversion of special nuclear material. The commission had concluded that it should qualify such statements because of the uncertainty surrounding NUMEC and because of measurement uncertainty inherent in handling large quantities of SNM. Victor Gilinsky also recalled, "I specifically told him about the Duckett briefing before his hearing—in the company of Kennedy and two others, one of whom claimed that Gossick was called away just as I was saying the key words."⁵²⁰

In spite of the advice about the commission's use of qualifiers and uncertainties in describing the evidence of a diversion, General Gossick and Robert Fri, the Acting Administrator of ERDA, testified at the Udall hearing that there was no evidence of a diversion at Apollo. Jim Conran and senior staff of the Division of Safeguards and the Office of Nuclear Materials Safety and Safeguards also attended. Our heads wobbled when Gossick said there was no evidence of a diversion.

The same day that he testified to Udall's subcommittee, ERDA's Acting Administrator Robert Fri, accompanied by Generals Giller and Starbird, received a briefing from CIA.⁵²¹ Ted Shackley provided the briefing in Fri's office. ERDA requested the briefing in connection with its pending August 4 release of the historical summary of strategic SNM inventory differences. In his briefing, Shackley provided a talking paper

that Giller recalled “as a basic recompilation of the already-known background information and evidence [gathered by CIA] relating to the issue.” Although DOE, ERDA’s successor agency, redacted much of Giller, Starbird and Fri’s recollections of the briefing, Giller did mention some things not addressed in redacted summaries of other briefings that Shackley conducted in the summer of 1977. For example, Giller “emphasized his belief that, even with careful analysis, the possibility of poor information stemming from HUMINT [human intelligence] sources still remains.” He went on to say, apparently in reference to something Shackley said about the discovery of HEU in Israel, “the U.S. government has made authorized shipments of high-enriched SNM to Israel in the past, which were intended for the Israeli reactor program.”

No documents have been found to show that the former ERDA officials passed along the new information provided by Shackley. Although much of Shackley’s briefing was redacted from the referenced DOE document, it is logical to assume that he told the ERDA officials the same thing he told the NSC staff on July 28, 1977.

In September 2015, CIA released a five-page Talking Paper that may have been the one shown to the three ERDA officials on July 29, 1977. Unfortunately, the paper was so heavily redacted that it shows no date or setting for the message it delivered. Unredacted statements on page four of the Talking Paper are of interest in determining who knew what and when. It is clear from this disclosure that CIA did not tell FBI everything it knew about the possibility of a diversion to Israel.

While this information [referring to 12 lines of redacted information immediately preceding] is of obvious importance in reaching an intelligence decision on the probability of diversion, it is not of any legal pertinence to the FBI’s criminal investigation of NUMEC. In our discussions with the FBI we have alluded to this information but we have not made the details available to the special agents from the Washington Field Office of the FBI who are working on the case.

That same day, Congressman Dingell called the National Security Council to say he was “troubled about investigations of Materials Unaccounted For ... particularly the NUMEC plant... . He understands both the FBI and the CIA have been involved.” Dingell asked that the NSC brief two of his staffers, Michael Ward and Donna Levigne.⁵²²

On August 2, Ted Shackley, Carl Duckett (by then retired from CIA) and (name redacted), a representative of CIA’s Office of Legislative Counsel, briefed Frank M. Potter and Peter D. Stockton of the Subcommittee on Energy and Power of the House Committee on Interstate and Foreign Commerce.⁵²³ The Memorandum of Record prepared by Shackley said the Committee Chair, Congressman Dingell, requested the briefing. Shackley pointed out that he was neither a scientist nor a first-hand participant in the events that unfolded from 1968 to 1977 relative to the NUMEC case. He merely provided “supervision to the people who were conducting research on the Agency’s involvement in the NUMEC case.” Shackley said there were gaps in the records. “Mr. Duckett chimed in to say that he personally had been a participant in several key discussions around

Washington on the NUMEC issue on which he had written no memoranda for the record, therefore, he could understand the frustrations that were being encountered by Mr. Shackley and his associates in their attempts to fully reconstruct the events which had transpired... .”

The discussion then centered on Duckett’s recollections. Duckett said “CIA had been concerned about the nuclear weapons proliferation issue for a number of years (six lines redacted). As a result, CIA began to look at information which was available to it concerning possible diversion of uranium materials from NUMEC.” Reading between the lines and acknowledging that CIA efforts focus offshore, the Agency must have gathered some intelligence in Israel that there was enriched uranium in the Israeli weapons program that could not have been produced or shipped there. Hence, the Agency went looking for other sources and focused on NUMEC.

Duckett told the Congressional staffers “as he recalled the situation, approximately 178 kilograms of uranium were missing from NUMEC.” The DOE redacted the next three lines from the memorandum before CIA released it in September 2015. In the next twenty or so lines of the memorandum, most of which are redacted, Duckett told the staffers that this was “his most telling point in his hypothesis.” Duckett said the “CIA was the recipient of FBI and AEC material on the alleged diversion and this data influenced the CIA estimating process on the key issue of did Israel have a nuclear weapon system.” Shackley confirmed that Helms wrote to the Attorney General in 1968 requesting an investigation because of the possibility that a diversion from NUMEC had taken place. Duckett told the staffers “he could say with certainty that CIA, as an institution, had not been involved in any kind of nuclear materials diversion operation.” Duckett then recounted the story Helms told him about the briefing of President Johnson in which Johnson told Helms not to tell anyone else about the Israeli bomb. Although this part of the memorandum is redacted, it is obvious from context that this was the subject of discussion. Shackley supported Duckett’s statement about no involvement of CIA in any diversion of weapons material. Neither Shackley nor Duckett offered evidence to support their conclusion.

Shackley said he did not know if an FBI investigation of the NUMEC case was currently underway. In response to questions about who would have first-hand knowledge of past investigations of the NUMEC case, Duckett referred the Congressional staffers to George Murphy of the JCAE staff and Richard Kennedy then an NRC commissioner and a former NSC staffer. In response to a question about how to transport stolen uranium from NUMEC to Israel, Duckett gave a two-and-a-half-page response that CIA completely redacted when it released the memorandum. Shackley recorded in the Memorandum of Record that CIA stressed throughout the briefing it “did not have any facts which would stand up in court which could be used to conclusively prove that there was linkage between the alleged NUMEC diversion (six lines redacted).” Shackley probably had no knowledge of the unique uranium enrichment that the Portsmouth gaseous diffusion plant produced for the U.S. naval reactor fuel processed by NUMEC. There were some secrets that Admiral Rickover and the Naval Reactors Office of AEC/ERDA/DOE kept from nearly everyone until 2006 when the DOE released its history of uranium enrichment in the United States. In any event, the CIA redacted roughly half of this thirteen-page memorandum, making it impossible to know the qualifiers that Shackley placed on his conclusion about “conclusive proof.”

On August 2, 1977 National Security Advisor Brzezinski wrote a memorandum to President Carter on the NUMEC affair.²⁹ Brzezinski said he had been briefed by ERDA, FBI and CIA and summarized the “essential conclusions” for the president. He said that all but 56 kilograms³⁰ of the missing material from

NUMEC could be physically accounted for, but ERDA believes now (but has no evidence) that even this remaining 56 kilograms can be accounted for by operational losses, but this will be a very hotly contested conclusion. The ERDA report also reaches a very carefully guarded conclusion that no evidence of theft of significant amounts of material has been found.

Two pages of narrative follow this excerpt, summarizing the two FBI investigations and the AEC investigation of NUMEC. The ISCAP redacted about half of that part of the memorandum when it released the document in March 2014.⁵²⁴

In his memo for Carter, Brzezinski took at face value ERDA’s claim that the AEC had investigated the NUMEC affair. He also passed off the FBI’s findings as amounting to no more than confirmation that Zalman Shapiro had frequent contacts with Israeli officials, including a science attache “thought to be an intelligence officer,” and that Shapiro received unexplained VIP treatment in Israel. Brzezinski either did not know or he knew and did not tell Carter of Shapiro’s other contacts with Israeli intelligence and nuclear weapons officials.

Brzezinski told Carter the FBI had just concluded its latest investigation and “was unable to uncover any evidence of theft, although the interviews included many current and former NUMEC employees.” In fact, the FBI investigation continued for two more years, and interviews of NUMEC employees revealed suspicious circumstances concerning NUMEC’s shipments to Israel, as described below.

Brzezinski opined, “While a diversion might have occurred, there is no evidence—despite an intensive search for some—to prove that one did. For every piece of evidence that implies one conclusion, there is another piece that argues the opposite. One is pretty much left with making a personal judgment—based on instinct—as to whether the diversion did or did not occur.” Apparently, Brzezinski did not grasp the contradiction in his saying there was no evidence of theft and then saying there was essentially equal evidence on each side of the case.

The next sentence of the memorandum revealed the level of trust in high circles when it came to NUMEC. Brzezinski said, “So far as we know however, (and we have made serious efforts to discover it) there is nothing to indicate CIA participation in the alleged theft.” Since there is no record of a separate NSC investigation of the alleged theft and CIA’s possible involvement, and since the FBI’s records contain no indication that the Bureau looked into that possibility, one is left to wonder what Brzezinski meant. Taken at face value, his words meant that the Carter Administration’s reaction to the CIA’s efforts to draw attention to Israel’s theft of bomb material was to wonder whether the CIA participated in the theft. More likely, when Brzezinski said, “we made serious efforts to discover it,” he was referring to the Justice Department’s investigation (conducted as part

of President Ford's call for the third FBI investigation of NUMEC), which was still underway and included consideration of a possible coverup by government officials.

The last part of Brzezinski's memorandum to Carter indicates the administration's intentions regarding the NUMEC affair. Brzezinski said, "We face tough sledding in the next few weeks (particularly in view of Cy's [Secretary of State Cyrus Vance's] Mid-East trip) in trying to keep attention focused on ERDA's technical arguments and, if necessary, on the FBI investigations, and away from the CIA's information."

Three days later, on August 5, Ted Shackley and (name redacted) provided briefings for Senator John Glenn (D-OH) and Representative C. G. Mike McCormack (D-WA). In both cases Shackley relied on an outline that was prepared by CIA staff. Leonard Weiss of Senator Glenn's staff attended the Glenn briefing.⁵²⁵ The cover memoranda did not get into the details of Shackley's two briefings. There were lengthy question and answer exchanges with Glenn and fewer exchanges with McCormack. Some of the exchanges were redacted completely when CIA released the memoranda. In the unredacted portions of both memoranda, it is clear that Glenn and McCormack were both interested in the involvement of the presidents that had knowledge of the case, i.e., Johnson, Nixon, Ford and Carter. Shackley and his colleague told John Glenn they had not seen any single document "which would lead to a flat conclusion that a diversion had occurred... ." Glenn asked if there were "bad connections between FBI and CIA on NUMEC." Shackley stressed that the two agencies took different approaches to the basic question. "CIA was trying to obtain information which would clarify an intelligence estimate. On the other hand the FBI was looking for material that could be used in a criminal case." Glenn also asked, "What did Jim Angleton have to do with the NUMEC matter?" Much of Shackley's short answer is redacted, but it has some interesting implications. "Mr. Angleton was the Chief of the CI [Counter Intelligence] Staff (two lines redacted). As a result (name redacted) had worked for Mr. Angleton. In view of this situation Mr. Angleton had obviously been aware of and interested in (name redacted) activities." The point was made that such activities "obviously focused on NUMEC (two lines redacted)."

After his assignment as CIA Station Chief in Tel Aviv, John Hadden transferred to CIA headquarters where he reported to James Angleton. Perhaps the name redacted in this document is that of John Hadden, but since he died before the document was redacted and released by CIA in September 2015, it is not clear why his name should have been redacted. In response to another question, Shackley denied there was any U.S. involvement in the diversion. Glenn asked a question about the substance of the "cocktail conversation," probably referring to something that Shackley mentioned in his briefing, perhaps Duckett's 1976 leak about the number of Israeli nuclear weapons. Shackley responded to the senator that CIA did not know and "had no way of correlating this event to anything that was in our files." Glenn asked if others in NUMEC were involved, and Shackley's ten-line answer was entirely redacted by CIA. Shackley referred several of the senator's questions to FBI, ERDA and National Security Advisor Brzezinski. Shackley closed his memorandum by noting his impression that Senator Glenn intended to hold a Senate Hearing into the NUMEC diversion.

Shackley's summary of the McCormack briefing was much shorter. McCormack

asked what he stressed was a hypothetical question, “If President Johnson had directed that a diversion of nuclear materials occur, would the CIA have known it?” Shackley responded, “This is a question that should be put to those who were direct participants in the events of the time. In short, this would be the type of question that Mr. Helms or Mr. Duckett could best comment on.” Shackley gave a similar answer to another question by McCormack, “Suppose CIA Director Helms and FBI Director Hoover had stumbled on information suggesting a possible diversion authorized at the highest level of the U.S. Government? What then?” CIA redacted about one-third of the four-page memorandum on the McCormack briefing.

On August 8, 1977, Congressman Dingell held a hearing that addressed the inventory difference report (ERDA-77-68) in general and the NUMEC in particular. General Gossick again represented the NRC. Generals Starbird and Giller represented the newly formed Department of Energy (DOE).³¹ All three generals testified under oath that there was no evidence of a diversion at Apollo. Gossick went even further in response to a question from Michael Ward, Subcommittee Counsel. Gossick said the “no evidence” conclusion was reached by the commissioners “in full knowledge of the briefing they had received from the CIA and ERDA.” Thus, he contradicted what the Conran task force had been told by Eagle and Strauss. Furthermore, CIA had briefed Ward just days before, so he might have known more than the witnesses about the possibility of a diversion.

The day after the hearing, David Burnham reported in the *New York Times* that Michael Ward of the Dingell committee staff said intelligence officials had “strong suspicions that a diversion occurred... . [Ward] was not free to identify who had talked to the subcommittee staff, but an informed source said it had been the Central Intelligence Agency.” Burnham reported that several months earlier a former top-level intelligence official said that he had once seen a report that Israel had stolen nuclear materials.⁵²⁶

On August 23, Ted Shackley and two other CIA staffers (names redacted) briefed Congressman Udall and his committee staffer Henry Myers on the NUMEC case.⁵²⁷ The briefing apparently followed the same outline as the August 5 briefings of Senator Glenn and Congressman McCormack. The CIA redacted more than two pages of the six-page summary of the briefing. There were interesting similarities and some differences in Udall and Myers’ questions compared to earlier briefings. When asked whether FBI had interviewed Shapiro, Shackley said the “Agency has no knowledge of any direct debriefing of Mr. Shapiro by the FBI.” Asked if President Johnson, “who was known to be a friend of Israel, could have encouraged the flow of nuclear materials to the Israelis,” Shackley responded “There is no information in the CIA files which are currently available to us which would indicate that President Johnson had ever undertaken any action which would have resulted in a diversion of nuclear materials to Israel.” CIA redacted the next few lines in the memorandum concerning a “vignette” involving something Helms told Duckett. Perhaps this was the story Duckett told the NRC of Johnson telling Helms not to tell anyone about the Israeli bomb. The CIA also redacted nearly two pages of the answer to the question of how one would go about diverting

material from NUMEC to Israel. In another answer, Shackley “stressed that CIA had never obtained any hard intelligence (half line redacted) which clearly linked NUMEC to the subsequent production of uranium-based nuclear weapons by Israel.” Perhaps that redaction concerns the HEU that Hadden found in the environment near Dimona, which Shackley described to the ERDA officials on July 29 and perhaps others that he briefed that summer. Udall closed the meeting by noting that he would be meeting with the FBI that same day. No record of that meeting has been found.

On September 19, FBI Director Kelley transmitted a report of the Bureau’s investigation to the special agent in charge of the Washington Field Office. The director concluded, “our intensive investigation into alleged diversion of Special Nuclear Material from NUMEC in the mid 1960s (redacted) a subsequent coverup of that diversion by certain U.S. governmental agencies has thus far failed to develop any positive information that would lend credence to these allegations. That is, of course, not to say that such a diversion did not, in fact, occur.” The transmittal letter, instead of stopping the investigation, listed some other individuals (names redacted) to be interviewed.⁵²⁸ Try as it might, the FBI could not kill it—with help from the White House and the Congress, the NUMEC investigation had a life of its own.

In November 1977, the Department of Energy released 20 volumes of documents relating to its investigations of NUMEC, pursuant to a FOIA request. An internal FBI memo noted at the time, “the press and Congress wish to show that the Johnson Administration had caused the FBI to slow down their investigation in order to cover up the activities of NUMEC.” The FBI belied the allegation by soldiering on with the interviews requested by the Department of Justice.⁵²⁹ My 2009 request to access the 20 volumes of documents released by DOE in 1977 led DOE staff to say the documents could not be found.

Stimulated by Conran’s letters, the work of the Conran task force, and the Congressional hearings, the *New York Times*, *Washington Post* and *Washington Star* published a number of articles in late 1977 about NUMEC. Those articles provided the first public airing of explanations offered by AEC for the missing uranium and of Shapiro’s close ties to Israeli intelligence and defense officials. The stories also were the first time that the public heard about the doubts harbored by Hoover. The reporters that wrote about NUMEC relied on sanitized documents that were becoming public for the first time and statements by both named and unnamed sources that saw the original documents.

NUMEC-related correspondence between NRC and Congress also heated up in late 1977 on several issues, including the question of whether General Gossick lied when he testified at the Dingell and Udall hearings when he said there was “no evidence” of a diversion. For example, on November 15, Congressmen Paul E. Tsongas (D-MA) and Udall sent a letter to NRC saying they agreed with the Conran task force that if a diversion had occurred at Apollo, “It would send us back to the drawing boards.”⁵³⁰ That is, a

diversion of the kind that was alleged, even though it may have occurred a decade before NRC was created, would be germane to the ongoing work of NRC to assure adequate safeguards. It would, for example, speak to the possible role and level of authority of an insider that might aid such a theft.

The Congressmen went on to say that National Security Council staff, CIA and FBI had briefed them after Gossick testified to their subcommittee. “In light of all this, we believe it to have been a serious misrepresentation of the facts to suggest, as did Mr. Gossick in his testimony on July 29, that there is no evidence of a diversion.” They also noted that former Chairman Anders was, “sufficiently apprehensive as a result of the briefing by the CIA and ERDA that he alerted the White House, after which President Ford initiated the investigation that still seems to be in progress. We also believe it noteworthy that Mr. Chapman, the former Director of the Office of Nuclear Material Safety and Safeguards, stated in a public radio interview that he did not consider the matter closed.” Barbara Newman of National Public Radio conducted the August 15, 1977 Chapman interview wherein he told her there was “not enough evidence to bring about a prosecution [of Shapiro] ... [and that] if material had been taken, there must have been high level involvement in whatever happened.”⁵³¹

By the time NRC received the letter from Tsongas and Udall, Dr. Joseph Hendrie had replaced Marcus Rowden as Chairman of the Commission. Hendrie responded to the Congressmen on December 10, telling them, in essence, that Gossick had been in the dark about CIA and ERDA briefings, had read some recent technical reports before testifying that were approved by NRC and ERDA and that contained “no evidence” statements, and had not meant to cause all this confusion. Hendrie also pointed out that people within NRC had legitimate differences among them on the meaning of the term “no evidence.” He concluded by saying that “no conclusive evidence” was a better way of describing the situation and, “for regulatory purposes, we must assume the circumstances were such that a diversion could have occurred, and must construct our safeguards requirements accordingly.”

Hendrie attached a letter from Gossick saying it had been his intention to tell Congress what the commission believed about the Apollo matter, but he had missed the mark. Gossick went on to parse his prior testimony to show how one could read it to be consistent with the commission’s interpretation of the situation and said the Congressmen’s accusation of his having misrepresented the facts was “deeply and personally agonizing.”⁵³²

The Gossick letter irritated Commissioner Gilinsky who wrote to Congressman Dingell to say Gossick’s “blanket denial on behalf of the Commission itself that any evidence existed to indicate any significant amount of strategic special nuclear material had ever been stolen or diverted ... did not represent my view... . My view is now, as it was then, that no such categorical statement is possible.”⁵³³ A few days later, the *Washington Post* ran a story about the fight the Udall and Dingell committees were having with NRC over whether they were being told the truth about NUMEC. The *Post* reported that FBI, CIA and NSC had briefed the Udall committee. Although Udall and his aides

would not comment on what they had been told, “Sources have said the briefings included ‘circumstantial evidence’ that Israel had built an atomic bomb out of highly enriched uranium about the same time that more than 200 pounds of the same material went missing from the Apollo plant operated by NUMEC.”⁵³⁴

Key staff of the Congressional oversight committees pressed FBI, CIA and NRC for more details. With prodding by Myers, the CIA told the NRC on December 22 that it no longer objected to declassification and release of reference 102 of the report by the Conran task force. ERDA soon followed suit, and on December 27, NRC released the document without redaction and placed it in the NRC public document room. It was the first public admission by the U.S. government that CIA and ERDA had briefed the NRC in February 1976 about NUMEC. The document said it was not possible to make unqualified statements about the evidence of a diversion.⁵³⁵

Soon thereafter, on January 9, 1978, Dingell wrote to Hendrie to say that he was not satisfied with the answer that had been provided by Hendrie and Gossick to Tsongas and Udall. He noted that reference 102 “acknowledges the existence of intelligence information relating to the possible illicit diversion of material from NUMEC.” Dingell also referred to the separate letter from Gilinsky on December 12 saying he had advised Gossick before his testimony of the substance of the Executive Branch’s briefing on NUMEC. Dingell went on to express his frustration with repeated instances of NRC’s ignorance of and disinterest in information relating to matters within its jurisdiction. He looked forward to receiving evidence that would justify his future reliance on information provided by the commission.⁵³⁶

While the Gossick brouhaha continued to demand the attention of NRC and Congress, the CIA continued to inform Congress about its conclusions regarding NUMEC. In December 1977, DCI Stansfield Turner wrote to Senator Daniel Inouye (D-HI), Chairman of the Senate Select Committee on Intelligence, responding to Inouye’s queries regarding reports about NUMEC in the press.⁵³⁷ Turner said “The Agency was not involved in the investigations of the alleged diversion, but our summary of related events may provide you with background that may be useful.” He went on to recount information that CIA redacted in its 2015 release of the letter. The redacted information related to NUMEC’s inability “to account for a significant amount of enriched U-235,” which, when combined with CIA’s intelligence gatherings, led to the DCI’s request in April 1968 that the FBI conduct an investigation of Shapiro. These statements confirm that the intelligence CIA gathered in Israel concerned HEU and led to the 1968 letter from Helms to Clark. Turner also recounted the various high government officials that CIA had informed of its findings. He closed with the thought, “The NUMEC case has raised unusual press attention which has touched upon sensitive intelligence sources and methods.” Indeed, CIA was still claiming in 2015 that its sources and methods justified extensive redactions in this document and others that were 40 years old. If those sources and methods proved that U-235 was not diverted from Apollo, then surely CIA could have released them by now.

On January 10, 1978, FBI Director Kelley wrote to Udall saying that the Justice Department and FBI legal counsel briefed Myers of the Udall staff and others on the Bureau's investigation of NUMEC. A *Newsweek* article that week laid out the NUMEC matter in more detail than had been previously available, drawing either on the briefings provided to Congressional staff or on a leak from the FBI itself.⁵³⁸

Then in 1968, the CIA got into the [NUMEC] case after receiving reports that Israel had somehow obtained a supply of enriched uranium. The agency had suspected since 1960 that the Israelis were working on an atomic bomb, but it doubted their capacity to produce necessary nuclear fuel at an experimental plant purchased from the French in 1957 and set up secretly near Dimona in the Negev. Using sophisticated technology, the agency confirmed traces of enriched uranium in waste from Dimona. And suddenly Zalman Shapiro's foreign connections—which often had made him a valuable source to the CIA itself—brought him under suspicion... . CIA director Richard Helms took the matter to President Lyndon Johnson. No official records of their meeting are available and Helms won't discuss it. But former CIA technical expert Carl Duckett later told government officials that Helms discussed the case with him and left the distinct impression that LBJ had ordered the agency to drop it... . Ramsey Clark, who was Attorney General, recalls authorizing electronic surveillance of Shapiro over several weeks. And an FBI agent remembers uncovering of some “pretty astounding things ... as to how this fellow Shapiro dealt with the Israeli intelligence service... . The FBI learned of a meeting at Shapiro's home in Pittsburgh at which a suspected Israeli intelligence official asked members of the American scientific community to obtain specific information for Israel... . My recollection is it was pretty well tied down without ever being proved... . We were told by the Department there was no need to pursue it because there would be no prosecution... . Hoover was somewhat offended at the fact that we were called off the case.” ... Some have suggested that Israel might have gotten an early supply of weapons-grade fuel from the French, who provided the Dimona plant. And others wonder if the whole story of Israel's early nuclear capability was actually disinformation fabricated by a sympathetic CIA to worry Arab leaders.

The *Newsweek* story stimulated more Congressional interest in NUMEC and led to briefings by FBI and CIA to other congressman, including the Senate Select Committee on Intelligence.⁵³⁹

On February 2, 1978, Ted Shackley briefed officials of the NRC on CIA's “role and position relating to the NUMEC case.”⁵⁴⁰ The briefing occurred in two settings so there were never more than two commissioners in attendance to avoid there being a requirement for a recording of the meeting pursuant to the Government in Sunshine Act. Two others

from CIA, names redacted, accompanied Shackley. The NRC attendees were given the opportunity to read a Talking Paper that summarized the CIA information.⁵⁴¹ The four-page Talking Paper was completely redacted when released by the CIA in September 2015. The summary of the meeting included the CIA statement,

We agreed with [Commissioner Kennedy's] assessment, confirmed that there was no legal evidence of diversion from NUMEC. (One and a half lines redacted) which prompted CIA interest in the nuclear material missing from NUMEC... . Mr. Hendrie concluded, as a result of this discussion, that the time frame of the MUF [ID]—mid '60's—was compatible with the time phasing expressed in the Talking Paper.

Gossick of NRC asked what CIA would say if confronted with the question “Do you have evidence of diversion?” The CIA response was summarized as, “we would say that there is no hard evidence, but a series of events and facts led to our intelligence conclusion that a diversion was a likely possibility.” The CIA representatives twice said they had no knowledge of the ongoing FBI investigation relating to NUMEC. The CIA redacted less than one page of the three-page memorandum of record before releasing it.

In addition to the Talking Paper, the CIA also released an outline of the February 2 NRC briefing.⁵⁴² The outline started with the notes that the briefer was not a scientist, was not a first hand participant in the case, but was supervising research of CIA documents on NUMEC. One entry in the outline read “Process of deductive reasoning to find out how uranium obtained.” This entry was followed by the subheadings “Results of Deductive Analysis, NUMEC, Shapiro, Centrifuge, (redacted).” The outline summarized the “Key Issues” with the following subheadings: “No Investigation of NUMEC by CIA, No Diversion by CIA, and No Hard Evidence.”

The CIA also issued a “Spot Report” in connection with the NRC briefing.⁵⁴³ The Spot Report explained why the briefing occurred in two sessions. It also informed the DCI that the briefers told NRC that the CIA could not “take the position that a diversion in fact occurred ... it was explained again that (two lines redacted) to the missing material from NUMEC.” The report noted that Commissioner Gilinsky said after the briefing he would like to prepare a brief statement on the issue of evidence of a diversion. The CIA officials agreed to look at the statement. However, they “seek [DCI] guidance on the proper CIA posture in this regard.”

On February 28, Thomas O'Toole reported in the *Washington Post* on the CIA briefing of the NRC. He said unnamed officials from CIA informed NRC “there were still strong suspicions inside the CIA that weapons-grade uranium had been smuggled to Israel more than 10 years ago ... NRC officials had come away from the second briefing unconvinced that the missing uranium had been smuggled to Israel.”⁵⁴⁴

Lyle L. Miller, CIA's Acting Legislative Counsel, wrote to the DCI on February 28 concerning the O'Toole report.⁵⁴⁵ He said NRC Inspector General Thomas McTiernan said the quotations were “not an official NRC release.” Miller summarized what Shackley told the NRC. “(2 lines redacted)... . The DDO will confer with the NRC to preclude any discussions of the CIA position on NUMEC with the press in the future.”

Several Congressmen continued to pester NRC about Gossick's testimony. On February 27, 1978, Udall chaired another hearing. In his remarks at the start of the hearing, Udall attacked Gossick's prior testimony, "... we now know ... from press reports that have not been denied ... that high level government officials have believed for years that there was a significant likelihood that highly enriched uranium had been diverted from Apollo." The press reported that same day that CIA was known to suspect that Israeli intelligence operatives might have diverted the material into Israel's nuclear weapons program.⁵⁴⁶ In their testimony at Udall's hearing, NRC Commissioners Gilinsky and Bradford criticized Gossick's July and August 1977 testimony that there was no evidence of a diversion at Apollo. Gilinsky said, "The statement is not warranted by the facts," while Bradford opined that Gossick's statements "clearly did not pass muster."⁵⁴⁷

This hammering on General Gossick by Congress and the commissioners was misplaced. It kept them from dealing directly with the possibility of a diversion of enriched uranium from America to Israel and the failure of the U.S. government to deal with it. Gossick was an honest man and a good manager, sensitive to the people with whom he dealt. He had many significant accomplishments in service to his country before coming to NRC and would not have risked his reputation for those good deeds in order to cover up the NUMEC affair in which he had no stake. Because he was cut out of ERDA, CIA and Conran task force briefings on the affair, it is likely that he failed to appreciate the importance of his turn of phrase regarding the evidence of a diversion and was too stubborn to admit his mistake. Others argued he was part of a coverup. Still others said he did what Generals Giller and Starbird told him to do. His loyalty to the generals and their desire to protect the U.S. weapons program probably outweighed the need for patience in selecting his words about the evidence of a diversion.

Benjamin Huberman, NRC's director of policy evaluation from 1975 to 1977 and an attendee at Duckett's briefing in February 1976, was outspoken in his criticism of the commission's treatment of Gossick. "It was atrocious... . They treated him, Gossick, unconscionably. If he had been at the briefing, he would not have been so poorly informed." He was excluded from sessions such as this because, in Huberman's opinion, the commissioners could not resolve in their own minds, the role of the Executive Director for Operations.⁵⁴⁸

The uproar that Udall, Tsongas and Dingell created over Gossick's testimony says more about Congress than it does about Gossick. By attacking his testimony and character, the Congressmen vented their anger over being unable to resolve the NUMEC affair, one way or another. Gossick did not have the facts. Therefore, their vitriolic attacks on him diverted their attention from others who did have the facts, especially the CIA. In the end, the Congressional inquiries led to new information but no action to resolve suspicions about a diversion of bomb-making materials from Apollo to Israel. Congress apparently lacked or was reluctant to use the authority to subpoena Rickover, Seaborg, Helms, Clark, Shackley, Duckett and other senior officials of the Johnson administration to get official accounts of what occurred and who knew what in the 1960s. They also could have subpoenaed officials of the Nixon and Ford administrations to learn why Shapiro's clearance was not renewed and what else the presidents learned about NUMEC in the

1970s. Perhaps the Congressmen could have brought the various FBI investigations into the light. In the end, their attitude was much like that of President Johnson when he told Secretary Clifford, “don’t bother me with this anymore.”

On December 7, Brzezinski recorded in his Evening Report that he “reviewed the 30 lengthy responses drafted by DOE to Congressman Dingell’s questions on the Apollo-NUMEC-Israel issue. Dingell’s pursuit of the question of whether CIA withheld information from other agencies strikes me as potentially dangerous.”⁵⁴⁹

The next day, December 8, 1977, John Fialka scooped the rest of the Washington press corps with startling new information that appeared to prove that HEU from Apollo contributed to Israel’s first nuclear weapons. He reported that CIA officers in 1968 used sophisticated equipment to determine that Israel had enough highly enriched uranium to make several atom bombs.⁵⁵⁰

The identification of the Israeli uranium was believed to be the first hard evidence that sizeable quantities of a bomb-grade material had somehow been diverted from one of the five nations in the nuclear “club.” According to several government sources, the CIA then brought the FBI into the case and a top-secret surveillance and wire-tapping effort was focused on what was believed to have been the most likely source of the diversion, a company in Apollo, Pa., called the Nuclear Materials Equipment Corp.

On January 26, 1978, news of this incriminating evidence reached National Public Radio.⁵⁵¹ Journalist Barbara Newman reported,

It appears that the CIA learned Israel had enriched uranium from a high level Israeli based in Europe. According to these sources, the uranium was housed in Israel’s nuclear complex in Dimona. The CIA confirmed the presence of uranium by employing highly sophisticated technology: the CIA arranged for a source to douse a handkerchief in water in the vicinity of Dimona, then had the handkerchief analyzed in CIA laboratories. The tests showed the water was contaminated with highly enriched uranium.

Thus ended the decade-old secret: In 1968, CIA used spectrographic analysis³² to prove an American origin for the HEU it found in the environment near Dimona. Before then, information about CIA’s discovery was limited to a small number of senior officials of the U.S. government who classified it as top-secret national security information because it confirmed American complicity in Israel’s nuclear weapons program. Whether it fueled atom bombs or Dimona was beside the point—it was in Israel, it came from America and it was priceless.

²⁷ The ID report resulted from an FOIA request filed by David Burnham of the *New York Times* asking for “information

about the MUF problem.”

²⁸ Enno Henry Knoche served as Deputy DCI from July 1976 to August 1977 and was acting DCI from January 20 to March 9, 1977, between the DCI tenures of George H. W. Bush and Admiral Stansfield Turner. Turner became DCI in March 1977 and, according to David Corn’s biography of Ted Shackley (p. 342), forced Knoche’s retirement to send a message that change was needed.

²⁹ The president’s diary records a discussion on NUMEC the same day. President Carter also noted, “The question of the lost uranium in the 1960s that may or may not have gone to Israel is a matter we’ve been discussing. It’s going to be a public issue when ERDA makes its report.”

³⁰ There is no indication in the memorandum as to where Brzezinski heard of 56 kilograms. That value differed from what AEC told Congress about the material that was missing at NUMEC before 1966 and could not be accounted for (93.8 kilograms) and the amount of the inventory difference at NUMEC attributed to the Astronuclear contract (61 kilograms).

³¹ The Department of Energy replaced ERDA on August 4, 1977.

³² The enrichment of a particular sample of uranium can be determined by gamma-ray spectrometry (i.e., spectrographic analysis). Such assay methods were available in 1968 when CIA found HEU in Israel that was associated with the Portsmouth enrichment facility. The AEC Regulatory Staff codified those methods in “Nondestructive Uranium-235 Enrichment Assays by Gamma-Ray Spectrometry,” AEC Regulatory Guide 5.21, April 1974.

Chapter 13

Emergent Theories (1978)

Early in 1978, Congressman Dingell sent Michael Ward and Peter Stockton of his subcommittee staff to talk to the CIA about NUMEC. Shortly thereafter, Ward came to NRC's offices in Bethesda, Maryland for an impromptu meeting with Edson Case, deputy director of NRC's Office of Nuclear Reactor Regulation. Case was my boss at the time and he asked me to attend the meeting. Ward described a possibility that had escaped the Conran task force. He said his discussions with CIA led him to think that a secret deal might have been reached at the highest level of government in the mid 1960s for the United States to furnish uranium to bolster Israel's nuclear weapons program. Although the deal involved the diversion of uranium from NUMEC, the company could have been an unwitting accomplice to an unauthorized transfer in an otherwise legal shipment to Israel.⁵⁵²

Ward had in his possession a CIA report that discussed this possibility. It may have been the same report that CIA carried to the briefing of NRC in February 1976. Ward let us see but not keep the report. It left little doubt that CIA concluded a diversion occurred.

In January 1978, NRC investigators interviewed Duckett and the eleven NRC people that attended his 1976 briefing of NRC officials. The interviews were part of an internal NRC inquiry into whether General Gossick lied to the Congressional committees in 1977.⁵⁵³ NRC Inspector and Auditor Thomas McTiernan and several NRC lawyers conducted the inquiry at the direction of NRC Chairman Hendrie. When McTiernan released his report in February 1978, he intended to classify the entire four-page summary of Duckett's interview, but someone at NRC goofed and released the unredacted third page to the Udall committee, then to the NRDC and then to the press. That third page recorded Duckett's recollections of his 1976 briefing of NRC in the following areas.

- Israel's bombing practice with its U.S.-supplied A-4 aircraft "that would not have made sense unless it was to deliver a nuclear bomb."
- The question of diversion of uranium from Apollo in the 1960s was irrelevant to CIA interests in Israel in 1976 because Israel's nuclear weapons were then fueled by plutonium from Dimona.
- The last U.S. inspection of Dimona in 1969 was less than adequate to determine if there was plutonium there at that time.
- A shipment of 200 tons of non-enriched uranium from Argentina had been diverted to Israel through a West German cutout.³³
- The U.S. had not intentionally allowed material to go to Israel because he would have heard about it.
- Richard Helms told him not to publish CIA's 1968 National Intelligence Estimate that concluded the Israelis had nuclear weapons. Instead, Helms said he would take it up with President Johnson. Helms

later related that he had spoken to the president, that the president was concerned, and that the president said, “Don’t tell anyone else, even Dean Rusk [Secretary of State] and Robert McNamara [Secretary of Defense].”

- Chairman Anders apologized to Duckett for having so many people in the briefing and said that only he and Commissioner Kennedy would be involved in the future.
- During the briefing, one commissioner, probably Dr. Mason, commented with mock jocularity “My God, I almost went to work for Zal Shapiro. I came close to taking a job with him.”
- At the end, “It was a pretty somber group ... it was not a formal briefing. It was more of a discussion for the whole session.”

The ISCAP recently released a less redacted version of the McTiernan report. Approximately 40 lines of the four-page summary of the Duckett interview were still redacted. In the portions of the document revealed by ISCAP, there was little new information. Duckett recalled that NRC Commissioner Kennedy invited him to brief the NRC group in February 1976. He said he did not have to clear that briefing with anyone at CIA. He brought notes made for him by his staff to the briefing but did not leave them behind. He advised that he had been involved since 1964 with the NUMEC subject, i.e., about a year after he joined the Agency. Some of the material was redacted in the section of the summary where Duckett recounted the evidence surrounding the NUMEC affair. What was not redacted, in addition to the points listed above, included the following:

- Shapiro had frequent contacts with Israeli officials;
- NUMEC hired the AEC’s chief investigator of the MUF in 1965 while the AEC investigation was underway;³⁴
- The substantial variance in accounting records at NUMEC proves nothing;
- He did not buy the view that all the MUF can be stuck in hundreds of miles of pipe;
- He felt there was an undue amount of MUF at NUMEC;
- He felt there was very clear circumstantial evidence that the NUMEC material went to Israel;
- The attendees at the briefing could justifiably assume that what he said represented the Agency’s views;
- He did not announce a classification level for the briefing, but he used the word “sensitive” half a dozen times;
- He mentioned others that were involved in inquiries about NUMEC, including George Murphy of the JCAE staff, Myers of the Udall staff and Senators Inouye, Glenn and Jackson.
- He opined that Mr. Gossick was very quick to use less than

ideal words to describe the NUMEC situation. Better words would have been “no direct evidence.”

Several media accounts and recollections of people who attended the February 1976 briefing referred to a CIA report on NUMEC. This is important because CIA has not been forthcoming with a report, if there was one. Rowden, for example, said that Duckett came with a file of papers that he scanned during the briefing and may have read from them.⁵⁵⁴ The Conran task force was told that the CIA briefer carried an “information package” when he met with the commission in February 1976. When Commissioner Gilinsky read the task force’s reference to an information package, he wrote to Congressman Dingell to say that he did not recall such a package and that he had been advised by Bryan Eagle “that the CIA material was not traceable as the official who had briefed the NRC had by then left the Agency.”⁵⁵⁵ Gilinsky also told NRC investigators that he did not recall Duckett having a package of papers at the briefing and volunteered that Duckett’s demeanor was nervous, “his hands were unsteady.”⁵⁵⁶ Senior people at DOE also denied the existence of a report on NUMEC by CIA. “If there is a CIA report, I have not seen it,” General Giller told the *Washington Post*. His boss, General Starbird, agreed, “My answer is the same as Ed’s.”⁵⁵⁷

The 1978 inquiry conducted by McTiernan concluded, based on interviews with Duckett and the eleven NRC attendees at the briefing, “No CIA packet of information was offered to or refused by NRC at the February briefings. The results of the interviews indicated generally that the briefer spoke informally from a folder or loose papers.”

Shortly after McTiernan’s report was released, including the third page of Duckett’s interview, John Fialka, writing for the *Washington Star*, called it “the latest evidence to emerge from the agency showing confusion, alarm, and secrecy that still surround the loss of 206 pounds of highly enriched uranium from a private plant in Apollo, Pa., sometime in the mid 1960s.”⁵⁵⁸ The *New York Times* focused on Duckett’s description of Johnson’s involvement.⁵⁵⁹

John Fialka also noted the diversity of views among NRC commissioners and staff reflected in McTiernan’s report.⁵⁶⁰ In addition, he reported that in January 1978 investigators from three Congressional committees concerned with NUMEC interviewed Richard Helms. They found his memory “hazy” on the possibility that President Johnson may have prevented a more thorough investigation. Helms did recall for the Congressional investigators “that Apollo was a subject of concern when he was CIA director.” He said he had no recollection of telling President Johnson in 1968 that CIA had evidence that Israel possessed atom bombs. Asked whether he would deny any events described by Duckett, Helms said, “I don’t say they didn’t happen, I just have no recollection of them.”⁵⁶¹ Henry Myers attended the meeting with Helms. He later told Udall that Helms recalled that “Shapiro was an agent of the government of Israel and he [Helms] recommended that FBI conduct the [1968-69] surveillance.”⁵⁶²

Avner Cohen also interviewed Helms on these matters, but much later than Myers

and others from the Congressional committees. In 1996, Helms told Cohen that he had no recollection of Johnson asking him to keep information from Rusk and McNamara. He said he did not recall how Teller's opinion on the Israeli bomb "and other circumstantial evidence regarding diversion of nuclear material" got to his attention, but he thought "it likely that Duckett passed the information on to him and he conveyed it to Johnson."⁵⁶³

In June 1978, NRC staff finally requested a briefing on FBI's ongoing investigation into the Apollo-NUMEC matter. The letter from NRC Executive Director Gossick asked for a briefing "on the progress and results to date of any FBI investigations of the NUMEC matter."⁵⁶⁴ Although FBI had briefed many people by that time, it had managed to keep NRC in the dark. The FBI provided a top secret briefing on July 14, 1978 for two settings of NRC officials (evading the Sunshine Act once again), including the four commissioners, Gossick, his deputy William Dircks and senior staffers from the offices of International Programs, Inspection and Enforcement, General Counsel, Executive Legal Director and Nuclear Materials Safety and Safeguards.⁵⁶⁵ Three months later, NRC and FBI established a Memorandum of Understanding for "continued liaison, cooperation and exchange of information ... in nuclear matters."⁵⁶⁶

On June 21, 1978, Bill Knauf and Jim Anderson from DOE's Division of Inspection interrupted former AEC Chairman Seaborg's California retirement. Seaborg's notes on the meeting indicate that they came to talk about NUMEC and the allegation that Zalman Shapiro "diverted large amounts of highly enriched uranium-235 to Israel in the 1960's."⁵⁶⁷ The inspectors focused their questions "on the degree of surveillance of the Atomic Energy Commission commissioners on the NUMEC and the actions of the commission when the loss of material was reported." They also questioned Seaborg on his interactions with Attorney General Mitchell on whether to give Shapiro a hearing if upgrading of his security clearance was to be denied. "They told me that as late as 1971 CIA wanted to pursue this further but Mitchell declined to do so." Seaborg continued,

I asked them if any responsible persons feel that Shapiro actually diverted material to Israel. They replied that nobody with a scientific background believes this but that it is difficult to convince some members of Congress. They said that some enriched uranium-235, which can be identified as coming from the Portsmouth, Ohio plant has been picked up in Israel, which, of course, has excited some members of Congress. However, such enriched material has been sold on an official basis to Israel and this could be the source of the clandestined sample.

This Seaborg interview record is further confirmation of the Portsmouth signature for the HEU found by CIA near Dimona in 1968. It came packaged with a novel euphemism, "clandestined." Putting aside that tangential reference to the CIA, it is surprising that Seaborg would not have understood the difference in enrichment levels between the 93 percent enriched HEU in the Nahal Soreq reactor that came from Oak Ridge and the 97.7 percent enriched HEU that came from Portsmouth and was processed

into naval fuel.

Later in 1978, Congressman Dingell requested the General Accounting Office to conduct an independent investigation of the NUMEC affair. The GAO did so, but FBI and CIA refused to allow publication of GAO's report. This prompted Dingell to charge that there were "widespread suspicions of a government coverup of either a real or a feared diversion." The CIA said the reason for classification of the GAO report was classified.⁵⁶⁸ Both FBI and CIA had initially said they would go along with an unclassified report, possibly with some classified portions. Within a few months, both agencies insisted that no part of the report could be released to the public. Their unity in this reversal suggests White House involvement. The Camp David peace talks among President Carter, Egyptian President Anwar Sadat and Israeli Prime Minister Menachem Begin occurred in September. The GAO report, even as indefinite as it turned out to be, would have been embarrassing to the three parties in the ongoing peace talks.

On May 6, 2010, the government released the December 18, 1978 GAO report and related correspondence to the public in response to an FOIA request by Grant F. Smith. There were multi-page redactions in the report encompassing almost every paragraph that referred to the CIA, even though the report was then 32 years old.⁵⁶⁹ On March 18, 2014, responding to an appeal by Grant F. Smith, ISCAP released a less redacted version of the GAO report. It is clear from the report that in 1978 GAO had added its voice to a growing chorus saying a diversion could not be ruled out. Important points recorded by GAO in the report were as follows:

- GAO was denied access to reports and documents on the alleged incident by CIA and FBI;
- Based on the totality of GAO's inquiry ... the allegations have not been fully or adequately answered;
- GAO cannot say whether or not there was a diversion of material from the NUMEC facility;
- Federal investigations of the alleged NUMEC incident were uncoordinated, limited in scope and timeliness, and, in GAO's opinion, less than adequate;
- Each [AEC] inspection [before 1966] revealed significant deficiencies but [AEC] allowed the facility to continue nuclear operations even though a key field investigator at one point recommended that [AEC] stop providing nuclear material to the facility;
- The FBI did not focus on the nuclear diversion possibility until 1976, eleven years after the alleged incident;
- The 1965 [AEC] inspection of Apollo found that the inventory difference was about 2 to 3 times higher than experienced by similar facilities operating at that time;

- The \$1.1 million fine for lost material in 1965 was paid by NUMEC's line of credit with Mellon Bank, then ARCO bought NUMEC in 1972 [and assumed NUMEC's debts];
- NUMEC had mixed material among various contracts, a practice that was explicitly prohibited by [AEC];
- FBI agents involved in the current investigation [1978] said that while there exists circumstantial information that could lead an individual to conclude that a diversion had occurred, there is no substantive proof that a diversion occurred;
- GAO contacted 11 former and current CIA employees, but CIA then "blocked our efforts to continue;"
- "In an August 1977 meeting a former high ranking CIA official [probably Carl Duckett] informed GAO, in the presence of several current CIA officials, that information was developed by the CIA that made it appear that the NUMEC facility was the 'most likely' source of the material (redacted). GAO's understanding of the information that was presented at this meeting was subsequently provided to CIA in a memorandum of conversation. A knowledgeable CIA official who reviewed the memorandum expressed no opposition to GAO's use of the term 'most likely.'
- "Later, in a November 1977 meeting with CIA officials, GAO was informed that there [were] no data to specifically support such a conclusion. Further, GAO was informed by CIA officials that characterizing NUMEC as the 'most likely' source of the uranium-235 held by Israel was not the official position of the Agency but of perhaps one or two former Agency officials... . Subsequently, however, two former senior CIA officials responsible for collecting and analyzing such data told GAO that information does exist within the CIA linking the unaccounted for NUMEC material to Israel. One of these former officials was one of the five highest ranking employees of the CIA and reported directly to the Director of the CIA on this matter [Carl Duckett]."
- CIA refused to allow a former NRC chairman [Anders and Rowden were the only possibilities] to discuss with GAO a particular CIA briefing [probably the NRC briefing by Carl Duckett in early 1976];
- Discovery that a large amount of weapons-grade material could have been diverted would have been embarrassing to [AEC] and detrimental to its promotional responsibilities;
- The FBI's efforts to effectively investigate the incident were impeded by its lack of technical expertise—the agent in charge of the 1978 investigation thought the FBI was not competent to investigate an incident involving missing uranium;

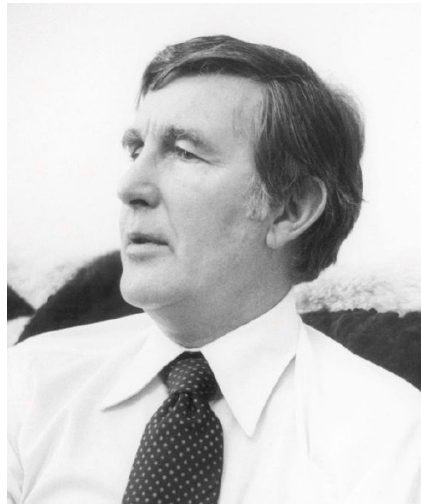
- FBI agents involved in the 1978 investigation believe that there is a substantial amount of information that tends to support the diversion theory;
- CIA Director, Admiral Stansfield Turner, added comments in a letter attached to the report. “While it is agreed that the nuclear material that has been unaccounted for since 1965 is uranium-235, it is less clear, despite lengthy investigations and inspections conducted at different times over the past thirteen years by GAO, the FBI and DOE [including AEC], as to what actually happened to this uranium;” and
- In Turner’s words, “In a policy sense the key allegations that continue to circulate relative to the material unaccounted for are:
 - a. The material was illegally diverted to Israel by NUMEC’s management for use in nuclear weapons.
 - b. The material was diverted to Israel by NUMEC’s management with the assistance of the CIA.
 - c. The material was diverted to Israel with the acquiescence of the United States Government.
 - d. There has been a coverup of the NUMEC incident by the United States Government involving a President of the United States.”
- Turner also commented on the apparent change in CIA’s position on the evidence of a diversion cited by Duckett. “This new material was not challenged at the time it was presented, but subsequent checks revealed that some of it could not be confirmed by documentary data. This does not mean the information as stated was not true.”

On December 21, 1978, Congressman Udall interviewed Shapiro at the Longworth House Office building in Washington, DC. The interview lasted from 3:00 to 5:00 p.m. Henry Myers and Michael McNulty represented the staff of the Interior and Insular Affairs Committee for the majority (Democrats). Robert Terrell represented Congressman Robert Bauman (R-MD). McNulty was a 26-year-old intern and a recent law school graduate. Myers had a doctorate in physics and was a veteran of the Arms Control and Disarmament Agency and the NRC.

Three lawyers appeared on behalf of Shapiro: Abe Krash, Leonard H. Becker and Hadrian R. Katz. All three worked in the Washington office of the Arnold & Porter law firm. Arnold and Porter LLP has been for many years a registered agent for the State of Israel under the Foreign Agents Registration Act of 1938.^{570, 35} Udall dubbed the interview “an informal meeting.” Shapiro was not under oath. However, he and his lawyers filed a thick brief before the interview, a 116-page verbatim transcript was taken, written opening statements by Shapiro and Udall were appended, and Shapiro’s attorneys

submitted supplemental remarks and corrections of the transcript on January 16, 1979.⁵⁷¹

Udall led the questioning and covered a wide range of subjects. The transcript reveals that he hurried through some of the material and missed several opportunities to ask more penetrating questions. However, at the time of the interview, Udall did not have access to FBI accounts of its investigations, including the one that was ongoing, nor did he have insights gained through the investigative journalism of Seymour Hersh or the memoirs of Glenn Seaborg.



Morris K. "Mo" Udall
Democrat, Arizona
U.S. Congressman
1961-1991

Shapiro made a number of significant points during his interview and provided new information about NUMEC. He started by saying that an "enormous burden" had been imposed on him and his family

by years of repeated investigations and reinvestigations of both NUMEC and myself, in response to vague, secret allegations by nameless, faceless accusers. My scientific career has been severely damaged; I have been foreclosed from the opportunity to do useful work in various areas in which I am highly qualified; and my family and I have experienced great anguish over these unwarranted and scurrilous charges. I would welcome the opportunity to confront my unidentified accusers and to refute their charges, but to my great regret, that opportunity has never been afforded to me. Accordingly, I can do little more than reiterate my denial of any involvement in any unlawful diversion, and attempt to respond to your questions to the best of my recollection after these many years.

Shapiro was adamant in his denial of the allegations of a diversion. "Let me state emphatically that I have never participated in any theft or diversion of special nuclear material. I have no knowledge or information concerning any such diversion. Furthermore I am not aware of any factual basis for the repeated allegations that material unaccounted for at NUMEC was caused by an illegal diversion." He said the material unaccounted for was explained by normal processing losses.

Shapiro said that ISORAD facilities in Israel were located “initially at Nahal Soreq, which was the Israel Atomic Energy Commission’s research center and there were several irradiation facilities, one of which was in the pool of the pool reactor, and we constructed the facilities for this... . Later on there were other radiation facilities that were put in operations.”³⁶ A month later, Shapiro’s lawyer added, “Dr. Shapiro would like to add for the record that he has never visited the Israeli facility at Dimona, he has never been invited, and he has never asked to go.” Apparently, Shapiro was concerned that his familiarity with Nahal Soreq and “other radiation facilities” not be interpreted to imply a familiarity with Dimona.



Dr. Henry R. Myers
House Interior Committee
1976-1991

Shapiro said that allegations in the press that he used a scrambler telephone to avoid FBI wiretaps were “unadulterated goomwah.” His lawyer later supplemented the record of the interview with Shapiro’s recollection, “on one occasion, while visiting the Israel Investment Authority office in New York, he may have used a telephone there as a matter of convenience to discuss some business venture with the Israeli scientific counselor in Washington. He has no knowledge whether the telephone contained an encoding device... .”

Shapiro said he established NUMEC because “I wanted to go into business for myself... . Initially the investors were private investors. I believe there were 25 of them, and the funds were raised ... through the Apollo Steel Company, and I believe they owned somewhere in the neighborhood of 30 percent of the stock initially.” Shapiro said that although he did not invest any of his own money in NUMEC, he received stock but could not recall how much. He was vague about the amount invested by the 25 original owners, saying it was “in the thousand dollar investment category.” This statement contrasts with his recollection that the total startup investment in NUMEC was \$250,000, implying an average of \$10,000 for each of the initial investors. He said the individual investors were principally investors in Apollo Steel, but he helped to recruit some others. He hesitated in identifying Lowenthal as the “main person in charge of Apollo Steel.” He said he and Lowenthal had no prior business dealings, “but I had met him through organizational work.” He strongly denied that there was any Israeli money involved in NUMEC

operations.

Shapiro said that the \$250,000 raised from investors was insufficient capital to begin operations, so NUMEC borrowed another \$250,000 from the Potter Bank in Pittsburgh. NUMEC secured the loan with the equipment it purchased for the Apollo plant.

Shapiro argued that some of his AEC contracts allowed crossover of material to other contracts while others did not. He also explained that crossover was necessary to operate the dissolution columns in the scrap recovery process; i.e., the process required enough scrap uranium to fill the various process elements and crossover of material among contracts was needed to provide that much scrap.

Shapiro claimed that the Astronuclear contract was where he learned that “our [prior] losses were greater than we had estimated and, therefore, the amount that we allocated to each [predecessor] contract and shipped back to the customer was greater than it should have been based on the actual losses that did occur versus those that were estimated. Is that clear?” Unfortunately, Udall replied, “Yes I think I follow” and turned to other matters. The interview might have taken another course if Udall had admitted uncertainty and said something along the lines of “No, it is not clear because I think this is your fourth theory for how you might have lost all that uranium. Which one of the four is now your best theory?” The four theories were, of course, 1) buried along with other wastes, 2) normal process losses, 3) holdup within process lines and in the cracks and crevices of the plant and 4) underestimates of prior project losses.

Shapiro said Lovett shared his conviction that there was misplaced complaining by AEC and Oak Ridge staffers about discarded production records at Apollo and records lost in the 1963 vault fire. Such records “had no relevance... . They were just grabbing at straws.” He said supervisory personnel discarded some unnecessary production records while they were cleaning up the plant during a two-month-long strike in 1964. When Charles Keller of Oak Ridge read these statements by Shapiro, he told Myers in 1979, “We thought in 1964 and I personally believe today that the ‘missing’ records would have been useful in establishing what happened to some of the materials.”⁵⁷²

Shapiro claimed that NUMEC would have exhumed more U-235 from the burial pits if AEC had not insisted on a prompt recovery because time was short and weather was adverse. He recalled, quite accurately, that NUMEC found 10 pounds of U-235 in the burial pits. The AEC’s records from the time showed the amount exhumed was 5.5 kilograms, or about 10 pounds, and that AEC added that amount back into inventory before it calculated the amount of U-235 that was missing. Shapiro did not claim in 1965 that any significant amount of U-235 remained to be found in the burial pits, but he did in 1978.

Shapiro also claimed that, “in a couple cases,” his overseas shipments “were intercepted [by AEC] and checked.” No such occurrence was found in any of the investigations of NUMEC, and AEC staffers told the commissioners in early 1966 that there were no such inspections of any overseas shipments before that time.

Shapiro left the impression that security at Apollo was good. He said there was a chain link fence around the whole Apollo operation. Photos and layout drawings of the

Apollo plant site from the 1960s show an eight-foot fence at the front of the building and no fence at the back and sides of the building or between the loading dock and the highway that passed in front of the building. In any event, Shapiro's statements conflicted with AEC and NRC's conclusions that the security was inadequate to protect against a sophisticated conspiracy.

Shapiro confirmed that guards were stationed around the clock at the single point of entry to the Apollo plant and the guards had regular rounds. He did not say whether they were armed before 1966. They were not. He said NUMEC could easily have detected intruders because they had to go through the change room before entering the processing areas and gaining access to locked vaults containing enriched uranium. He said all NUMEC employees had badges and either Q or L security clearances issued by AEC. He said the weight of material prepared for shipment would make "it almost impossible for one person by himself" to remove it from the plant. He did not point out that the criticality-safe packages of HEU were radioactively safe to handle and that an individual could easily carry several of them at a time. Udall did not ask Shapiro why some NUMEC employees told AEC investigators in 1966 that it would have been possible to steal HEU from the plant.

Shapiro said that MUF [ID] was inevitable because the processed uranium found its way to immeasurable places. He listed discarded waste, airborne dust that stuck to interior surfaces of the plant and equipment or exhausted to the environment, liquids spilled on floors and then lost with the mop water, liquid spills held up in porous concrete, coatings on the inside of pipes, liquid effluents from the plant, and disposal of worn-out, contaminated equipment. Udall did not ask Shapiro if NUMEC and AEC accounted for all of these loss mechanisms before they concluded in 1965 that 93.8 kilograms of U-235 were still missing. They did. Shapiro claimed that NUMEC's losses "were not larger than those of other plants doing similar work" and cited a 1977 DOE report to support his claim. Udall did not ask him why AEC held the opposite view in 1965 and its successor agencies, including DOE, had maintained that position ever since.

Shapiro said he "would have required many people [inside the plant] to help" arrange a diversion of a substantial amount of uranium. Udall did not ask him whether it was possible for one knowledgeable insider to steal enriched uranium a little at a time over a period of months or years and sequester it before shipping a substantial amount to a secret location. A year or so after this interview, NRC staff concluded that one such insider, with or without the assistance of outsiders, could have diverted 93.8 kilograms of U-235 from the plant without detection.

Shapiro told Udall he did not recall that Avraham Hermoni ever visited Apollo, but he did recall that David Peleg, administrative director of the Israeli Atomic Energy Commission, visited Apollo on two or three occasions in connection with "our joint operations of ISORAD." Cohen said that David Peleg served as Israel's science attache in Paris in the 1960s [while Dimona was under construction and starting up]. Peleg later served in various roles in the IAEC, including deputy director general and acting director general in the 1980s.⁵⁷³

Shapiro said that Hermoni "conducted the business, the ISORAD business, on behalf of the government of Israel. And in addition to that he was interested in technical

assistance from time to time.” Shapiro said he met Hermoni “probably less than a half dozen times” and denied knowing that Hermoni was associated with the Israeli nuclear weapons program. Udall apparently did not have access at that time to the FBI report of Hermoni’s visit to Apollo in 1968; nor did Udall know of Hermoni’s nuclear and intelligence duties for Israel, of which CIA and FBI should have known but apparently did not communicate to Udall.

Shapiro said he had been to Israel 17 times and shortly after the Six-Day War in 1967 accepted a special flying tour of the Sinai Peninsula and the Egyptian frontier. He attributed his special treatment in Israel to his support for Israel bonds, the Jewish National Fund and the Zionist Organization of America.

Udall asked if Shapiro intended to immigrate to Israel. Shapiro replied, “I never took steps towards it, but I certainly considered it because I think any Zionist considers what is called ‘aliyah,’ and I certainly considered it.”³⁷

Shapiro denied any relationships or contacts in the U.S. with Israeli intelligence operators but admitted meeting the head of military intelligence in Israel to discuss “a long-lived battery to be used in intrusion detection.” This was Shapiro’s fourth different explanation of his involvement with Israeli intelligence and atomic energy officials, i.e., plutonium-powered electric generators, water supply integrity, food irradiation and intrusion detection. Udall did not ask Shapiro if any of the projects had come to fruition.

Shapiro was asked whether experience gained by foreign scientists at NUMEC could have been applied in nuclear weapons programs. He answered, “Not that I can see at all.” Since the experience gained by Bernard Cinai in plutonium metallurgy at the Parks Township facility of NUMEC was directly applicable to the manufacture of plutonium weapons, Shapiro’s unequivocal denial was not justified.

Shapiro explained that his June 20, 1969 meeting at the Pittsburgh airport with Jeruham Kafkafi involved an overdue payment for equipment that NUMEC provided to Israel. He said the meeting was important and hastily arranged for Kafkafi’s convenience because of an upcoming financial audit in connection with ARCO’s acquisition of NUMEC. He claimed Kafkafi went on from Pittsburgh to Dayton to visit his daughter. This statement contradicts what Shapiro told AEC’s Security Director Riley on August 14, 1969, that is, he and Kafkafi “met at the airport and Kafkafi returned to Washington, DC shortly thereafter.” Similarly, Shapiro denied to Udall that he gave a package to Kafkafi, although other information shows the contrary. Later, in a follow up letter, he said he was unable to recall the exchange of any item at the meeting with Kafkafi.

Shapiro said he abandoned his quest for a higher security clearance for his work at Kawecky Berylco because the job at Westinghouse paid a lot better. He admitted that while his application for a security clearance at Kawecky Berylco was dragging along he consulted Avraham Hermoni on how to overcome the obstacle presented by his Israeli connections. Udall did not probe this answer by asking why Shapiro thought it appropriate for an intelligence official of a foreign state to address Shapiro’s qualifications for one of the highest security clearances in America.

Shapiro insisted under tough questioning by Terrell that he had no knowledge of whether Israel did or did not have a nuclear weapons program. In his later review of the

transcript of the interview, Duckett found this claim was implausible.⁵⁷⁴ Shapiro's tour of the Sinai in 1967 was evidence to the contrary—he was vitally interested in the security of the nation to which, at one time, he hoped to immigrate. In addition, the people with whom Shapiro had close contacts, such as David Bergmann, were intimately knowledgeable of Israel's nuclear weapons program. Shapiro's lawyers were quick to deny in their supplement to the record of the interview that Shapiro had any knowledge of Dimona. Evidently, Shapiro had enough knowledge of the Israeli weapons program to know it was important for him to avoid associating with Dimona.

Then, out of the blue, two-thirds of the way through the interview, McNulty blurted, "I have a question ... does Plumbat ring a bell?" Shapiro responded, "I have heard the name." McNulty said, "It's supposedly some scheme to divert some unknown tons of material ..." Krash interrupted, "There is a book on the subject ..." McNulty interrupted, "Yes." Krash plunged ahead, "published by the *London Times*, *Sunday Times*, which I assume you have seen." McNulty replied, "Right. And I just wonder if you had known anything about it. This book fairly convincingly portrays the ability of Israeli intelligence to—well, I guess 'divert' is a good word—to divert a whole shipload of yellowcake from the middle of the Mediterranean. You talk about how extremely difficult it would be to divert uranium from NUMEC. If they are so skilled as to be able to carry out this 'Plumbat' affair, it just seems to me that that same skill could be used. I just wanted to throw that out. I guess you really couldn't comment on that." Udall stepped in, "That was pretty far afield." McNulty, abashed, replied, "Yes." Udall then turned to another question. Imagine how Shapiro might have felt at that moment:

- He knew about Plumbat;
- He knew the formerly secret affair had become public (the book mentioned by Krash was derived from Leventhal's disclosure of the Plumbat affair the year before);
- He knew that in 1968, two months before the Plumbat affair, he met in his office at Apollo with Rafi Eitan and Avraham Bendor, two likely planners of Plumbat and two of the most notorious officers of the most effective intelligence services in the world;
- He had just failed to identify his meeting with Eitan and Bendor in response to a direct question from Udall about contacts with foreign intelligence agents;
- Based on the book alone, he knew that he arrived in Israel within days of the Plumbat uranium; and
- He was one of the most knowledgeable men in the world for converting the Plumbat uranium into Dimona fuel.

His attorney (Krash) alerted Shapiro to the danger in McNulty's question only moments before by reminding him to hew to the outline of the Plumbat affair described in the book. Surely, Shapiro also must have sensed the danger. It had to have appeared to him that McNulty understood the circumstances precisely. Then, suddenly, Udall interjected, McNulty hesitated and the questions moved in another direction. Without uttering a word,

Shapiro was spared from explaining the circumstantial evidence of his association with the Plumbat affair. Of course, the only one in the room at the time of the interview who knew of his 1968 meeting with Hermoni, Eitan, Biegun and Bendor was Shapiro, and maybe Krash, because the details of the meeting were then still hidden in the classified files of DOE and FBI.⁵⁷⁵ Close call.

McNulty could still recall, thirty years after the fact, the look on Shapiro and his lawyers' faces, "Like they swallowed a canary." With the benefit of hindsight, McNulty excused Udall's cutting him off, saying Udall probably deflected the question for fear it would expand the scope of his inquiry.⁵⁷⁶ It is too bad Udall did not realize how close McNulty was to the truth. However, the fact remains, with hindsight, Shapiro left out a number of people when he said his only contact with Israeli intelligence officers was in Israel where he met the head of military intelligence.

Later in the interview, Shapiro conceded that fines paid to the government for lost U-235 caused cash flow problems for NUMEC, but these were overcome by the company's line of credit with Mellon Bank. He confirmed that before the Astronuclear contract, "we had already declared losses, as I recall it, of 149 kilograms of material, and we had to pay for those, so this was the difference between 149 and 178, so we had already been paying heavily for the material." Shapiro had three-figure recall of the missing uranium but moments earlier he could not recall meetings he held with Israeli intelligence agents.

Shapiro volunteered that NUMEC stock yielded \$135 per share at the time of ARCO's buy out. He said, "I would have been ahead except for the fact that I put my heart and soul into this whole thing, and I don't know how much one can pay for that in money." The \$135 per share quoted by Shapiro was nearly six times the \$23.05 per share reported by the Pittsburgh press in 1967 based on information provided to NUMEC stockholders at the meeting where they approved ARCO's acquisition of their company.

At the close of the interview, Udall told Shapiro, "You are a very effective witness in your own behalf and, if what you told us today is true, you have got every right to feel aggrieved about the way you have been treated." Shapiro did not respond, and the interview ended.

On January 2, Myers wrote to Udall that Duckett had reviewed the transcript of the Shapiro interview.⁵⁷⁷ "

His initial impressions include the following: It is not plausible that Shapiro's knowledge of Israel's nuclear weapons was, as Shapiro stated, based only on press reports. Shapiro was not truthful when he said he had no relationship or contacts with people known to him to be Israeli intelligence operators; everyone has always assumed that there was no question but that Kafkafi had flown not to Dayton but back to Washington after the airport meeting.

On January 1, 1979, John Fialka wrote a nine-page summary account of the NUMEC affair in the *Washington Monthly*.⁵⁷⁸ He included the following key points.

During the late 1960s, Central Intelligence Agency operatives were able to prove something that U.S. officials had wondered about for several years. The question was whether Israel had quietly entered the world's nuclear "club," a possibility that had long been suggested by U.S. scientists returning from the Middle East.

The answer was yes. The CIA's highly sophisticated array of monitoring equipment had found evidence that somewhere in Israel there was a laboratory working with sizeable quantities of highly enriched uranium—the same metal used to incinerate Hiroshima in the closing days of World War II.

Once the Israeli capability had been established, the question became which of the five nations that then enjoyed the club status was the source of the Israeli material?

And the answer, at least from what the CIA could see, was that the bomb-grade metal had come from the U.S. The prime suspect was a private company, the Nuclear Materials and Equipment Corp. (NUMEC), located in Apollo, Pennsylvania, a small town about 30 miles northwest of Pittsburgh.

Their suspicion was that the nation's most vital safeguards system had been penetrated by one of our closest allies. It was, as one highly placed source later described it, "like dealing with the fact that your sister has been raped by a dear friend. It's not the sort of thing you rush to make public."

In 1968, after obtaining scientific proof that the Israelis were working with highly enriched uranium at a facility near Dimona in the Negev desert, Helms went to J. Edgar Hoover and asked him to put Shapiro under FBI surveillance.

The FBI told several Congressional investigators working on the case that its surveillance showed that in 1968 Shapiro traveled throughout the U.S. recruiting scientists, all of whom were Jews, for work on various technical problems confronting Israel... .

NRC [was briefed by] Carl Duckett, then the CIA's deputy director for science and technology and one of the government's official keepers of the NUMEC secrets. (Conran was not invited.) As some of the NRC commissioners recalled the briefing, Duckett's hands were shaking as he produced a file on the conference table. It was stamped "Top Secret," the highest national security classification. It was so secret that its existence was classified a secret. Duckett told the NRC commissioners that by the mid 1960s the U.S. had come to suspect that Israel had a nuclear weapons capability. The evidence included a type of bombing run being practiced by pilots of Israel's A-4 jet. According to Duckett, the maneuver "would not have made sense unless it was to deliver a nuclear bomb."

From this and more direct evidence gathered by CIA, Duckett said, in 1968 the Agency had drawn up a National Intelligence Estimate reporting Israel's entry into the nuclear club and submitted it to Richard Helms, then CIA director. Helms, Duckett recalled, told him not to distribute the estimate to other sections of the CIA or outside the Agency, and added that he would take the report to President Lyndon Johnson. (In the subsequent meeting with Johnson, Helms was told in no uncertain terms to drop the matter. "Don't tell anyone else. Not even Dean Rusk (then Secretary of State) and Robert McNamara (then Secretary of Defense)" Johnson allegedly instructed Helms.)"

"By the end of the meeting it was a pretty somber group," Duckett would later recall for the benefit of NRC investigators. Anders, he said, announced that, "in light of the sensitive nature of the information, he was going to the White House" with the NUMEC story. After he did, President Ford promptly ordered the FBI to begin a new investigation of NUMEC's activities during the mid 1960s.

Fialka's summary was based on his previous articles, including his stories in 1978 derived from the inadvertently released third page of NRC's January 1978 interview of Carl Duckett. Fialka said in January 2009 that he never met Duckett.⁵⁷⁹

On January 18, 1978, Carl Duckett wrote to Congressman Udall saying that suspicions of a diversion from Apollo were developed as part of a broader CIA probe into the availability of bomb-grade materials to a number of unspecified countries. Duckett also confirmed that CIA's suspicions resulted in the 1968 letter Richard Helms sent to Ramsey Clark requesting an investigation of NUMEC.⁵⁸⁰

On January 25, Henry Myers met with Duckett to followup on his letter to Udall and later that same day summarized their discussion.⁵⁸¹

Duckett believes that the totality of circumstantial evidence supports the conclusion that there is a significant likelihood that Apollo uranium went to Israel. The Duckett argument is as follows:

1. There is no benign explanation for the large quantity of missing uranium.
2. There existed channels from Apollo to Israel through which uranium could have been shipped undetected.
3. In the mid-1960s, there was reasonably solid evidence that the Israelis had nuclear weapons or expected to obtain them.
4. Shapiro's connections with the Israelis were close and there was reason to believe he was involved in a group, which supplied all sorts of classified weapons

information to the Israelis. If Shapiro [were] involved in providing weapons information to the Israelis, it would not have been a big step to providing them with uranium.

Three days after Myers met with Duckett, Fialka divulged the source of his report that CIA discovered HEU at Dimona in 1968.⁵⁸²

According to government sources, a retired Air Force General, Alfred Starbird, recently told investigators that a CIA official told him that the CIA had obtained a sample of highly enriched uranium from Israel and that it bore the chemical “signature” of material that had originated at the U.S. uranium enrichment plant at Portsmouth, Ohio. In a sworn statement to investigators of the Department of Energy’s Office of Inspector General, Starbird reportedly identified Theodore Shackley, deputy director of CIA for intelligence collection tasking, as the source of the information. If the information is true, this would amount to scientific proof of the first known diversion of the nation’s most heavily guarded nuclear material by persons acting as foreign agents.

An April 27, 1979 memorandum from the Deputy Inspector General of DOE to the Under Secretary of Energy [John Deutch] confirms that there was a meeting between Starbird and Shackley. In that memo, the Deputy Inspector General described an investigation that his office initiated 16 months earlier concerning the testimony of DOE officials at the August 8, 1977 Congressional hearing on NUMEC.⁵⁸³ The investigation was to determine whether “inaccurate information may have been intentionally furnished to the House Subcommittee on Energy and Power [the Dingell committee].”

The DOE inspector general’s office interviewed the three ERDA employees that testified to the Dingell committee, namely Robert Fri and Generals Starbird and Giller. The interviews were conducted under oath. All three men had occupied senior management positions in ERDA in 1977, but all had resigned from ERDA/DOE by the time of their interviews by the IG’s office in 1978.

James H. Anderson and William M. Knauf (the same IG investigators that had spoken to Seaborg on this issue) began the interviews on May 4, 1978, with General Giller. They interviewed him at an office in the Pentagon where he was working as a consultant. Eight days later, he swore under oath that their summary of the interview was true and correct.⁵⁸⁴ General Giller began the interview by telling of his involvement in drafting a 1974 National Intelligence Estimate that included a description of Israel’s nuclear capabilities. The estimate he described was Special National Intelligence Estimate, SNIE 4-1-74, “Prospects for Further Proliferation of Nuclear Weapons.”⁵⁸⁵ In that estimate, CIA said, “We believe that Israel has already produced nuclear weapons... . Our judgment is based on Israeli acquisition of uranium, partly by clandestine means; the ambiguous nature of Israeli efforts in the field of uranium enrichment; and Israel’s large investment in a costly missile system designed to accommodate nuclear warheads.” Giller

emphasized his dissent with that CIA assessment of the Israeli situation in 1974. Giller did not say whether he told the new NRC when it formed in January 1975 of his concerns with the CIA assessment.



Major General Edward B. Giller
U.S. Air Force
1941-1972
Deputy to CIA Director of Research
1960-1964
AEC Director of Military Applications
1967-1977

Giller said he based his “dissent” with the CIA position on his knowledge and understanding of the facts at that time. He was aware of a high-level discussion on the issue held privately by former AEC Chairman Dixie Lee Ray and CIA Director William Colby. The investigators’ report continued,

General Giller advised ... that sometime after NRC was formed, he received a phone call from the office of Mr. Marcus Rowden, NRC Commissioner, most likely around the early part of 1976... . Rowden wanted to alert the White House of the perceived significance of the old allegations of SNM diversion from NUMEC to Israel. He recalled that Rowden was concerned that some of the younger members of the NRC wanted to “spill the beans,” and he wanted to develop some kind of paper that would put the safeguards issue, and the NUMEC issue, in the proper perspective for President Ford. He explained that Mr. Rowden had institutional knowledge of the NUMEC situation through his employment as the Assistant General Counsel for Administration and Litigation for the AEC during the time frame of the alleged diversion.

General Giller commented that, as a result of this conversation, a meeting was held with staff of the National Security Council (NSC) in approximately March 1976, and present were President Ford’s NSC Advisor, Brent Scowcroft, Mr. Dave Elliott of the NSC, as well as Robert Fri, Marcus Rowden and a representative of the CIA. According

to General Giller, at the meeting the substance of a paper [to be] prepared by ERDA, CIA and NRC was agreed to as the basis for the FBI to take a “new look” at the NUMEC situation.

General Giller recalled that Mr. Robert Tharpe, Deputy Director, Division of Safeguards and Security (DSS), ERDA, and Mr. Ralph Page, Deputy Director, Division of Safeguards, NRC, received a briefing from the CIA in April 1976, which was to be used as the basis for a report to the NSC staff on the current status of nuclear safeguards and on the NUMEC problem... . He recalled reading the summary prepared by Tharpe/Page upon their return from the CIA, (three lines redacted)... .

General Giller stated that, subsequent to the Tharpe/Page visit to CIA, he and General Alfred Starbird, Assistant Administrator for National Security, received separate, detailed briefings from the CIA in April 1976, which did not cause him to alter his opinion that a diversion had not occurred. General Giller said that his conclusion was that a proof of diversion could not be made. He stated that he did not and cannot see sufficient evidence that there was a diversion, even though he also recognizes the lack of evidence to disprove the allegation. He recalled that either Mr. Sayre Stevens, [then Deputy Director] of the CIA [for Intelligence], or the CIA Deputy Director for Science and Technology [Duckett] in the April 1976 time frame conducted the briefing... .

General Giller advised that his only other interagency involvement in addressing the NUMEC issue took place in July 1977 when he, General Starbird, and Robert Fri, Acting ERDA Administrator, received a briefing in Dr. Fri's office, by Ted Shackley of the CIA, in which [Shackley] provided ERDA with a recast of, essentially, the same information ERDA considered in preparing for the [Inventory Difference] Report [ERDA-77-68], and the scheduled Congressional hearings on safeguards. He commented that he, Fri and Starbird each read a CIA talking paper on NUMEC. He characterized the paper as a basic recompilation of the already-known background information and evidence relating to the issue (15 lines redacted)... .

General Giller re-emphasized his belief that, even after careful analysis, the possibility of poor information coming from HUMINT sources still remains... .

General Giller explained that the U.S. Government had made authorized shipments of high-enriched SNM to Israel in the past, which were intended for the Israeli reactor program. This material has been and is under IAEA safeguards. (Ten lines redacted.)

General Giller added that, at the conclusion of the CIA briefing, he was offered a document, which summarized, chronologically, intelligence presentations given to AEC/ERDA officials relating to this issue. He

vaguely recalled another document, which he believes was nothing new, but a simple compilation of old data relating to the alleged diversion.

Several of Giller's points deserve response. First, it is important to recognize that his goal in the interview was to justify his testimony to Dingell in August 1977 that there was no evidence of a diversion from Apollo. Clearly, there was evidence, and he knew of it in advance of his testimony. Thus, to avoid prosecution for lying to Congress, he had to find a way to say it really was not evidence because it was not convincing to him for reasons he enumerated.

Second, Giller offered a reason why HEU might be found in Israel, i.e., the HEU that fueled the Nahal Soreq reactor. Thus, notwithstanding the redactions, Ted Shackley, not Carl Duckett or Enno Knoche, probably was the first to tell Giller in 1977 of the HEU with a Portsmouth signature that CIA found near Dimona. If Shackley did so in his briefing of Fri, Starbird and Giller, it is redacted in the declassified version of the Giller interview. However, there is no reason to suspect that Shackley told Giller something different than the IG representatives told Seaborg. It is noteworthy that Giller's argument for how HEU might have gotten to Israel was flawed on at least two counts: Nahal Soreq used metallic fuel and there has been no indication that it experienced fuel failures. Thus, none of the fuel should be in the environment, either at Nahal Soreq or 100 km away at Dimona. Furthermore, the Nahal Soreq fuel was of lower enrichment (93 percent) than highly enriched naval fuel (97.7 percent) produced only at Portsmouth and processed by NUMEC. If the Shackley briefing was indeed the first that the AEC and ERDA people heard about the Portsmouth HEU found near Dimona, then CIA waited 10 years to tell them.

Third, when under oath, Giller admitted reading at least two secret documents authored by CIA about NUMEC, documents whose existence he denied when questioned by NRC investigators and the press. The documents he described appear to have been the sort of Talking Papers that Shackley used in briefing a wide range of government officials on CIA's evidence of a diversion. It is possible that Giller was using the so-called Glomar response (named after the Glomar Explorer for which Duckett was honored, as described below). That is, when disclosure of the existence of a document would in itself disclose classified information it is permissible, under the Freedom of Information Act, to neither confirm nor deny the existence of the document. Since he flatly denied the existence of such documents before his sworn testimony, giving him benefit of the doubt on the Glomar response would have been generous.

Overall, Giller was quick to condemn CIA's conclusions about NUMEC, and his arguments for doing so were contrived and flawed. He apparently was determined to create doubts about the Portsmouth signature of the HEU sample collected near Dimona because he, like Seaborg, sought to protect the nuclear weapons establishment from the embarrassment of a diversion from Apollo.

Some of his arguments were valid. For example, scientists today say that it is nearly impossible to simply look at isotope ratios in a sample of HEU and tell where it was enriched.⁵⁸⁶ CIA's science and technology directorate would have known of this limitation in 1968, yet the analysts in that directorate were convinced that the HEU found near

Dimona came from Portsmouth. There must have been a simple explanation for how CIA knew about Portsmouth with such certainty. Finding traces of 97.7 percent HEU from the U.S. naval reactors program in the environment near Dimona provides that simple explanation.

Not all of the HEU that was missing from Apollo was naval fuel material. The rest came from various other contracts, such as the Astronuclear contract, which involved materials that were enriched to about 93 percent. Thus, some of the HEU found at Dimona probably could not be associated conclusively with Portsmouth because it was not 97.7 percent enriched.

Peter Stockton, head of Congressman Dingell's investigation of NUMEC, confirmed this conclusion. "I have always known that the uranium found near Dimona was 98 percent enriched. I thought everyone knew that."⁵⁸⁷

In retrospect, it appears that Giller made things up in his interview with the DOE investigators to create doubt about CIA's evidence of a diversion and thus protect himself from a charge of lying to Congress. His normal approach to people with whom he disagreed can be described by one word—confrontational. He also was unwavering in defense of the nuclear weapons program. Anyone who questioned the party line brought out all the verbal firepower at his command. He was a know-it-all, often demeaning others with whom he disagreed. It appears from the similar contents of their interviews with the IG investigators that he and his ERDA colleagues simply made up counter arguments to CIA's position. These arguments spread throughout the NUMEC cognoscenti in the late 1970s and became gospel without anyone ever looking at the technical facts. And then there is the additional complication that DOE did not declassify the unique enrichment level of naval fuel produced at Portsmouth until 2006.⁵⁸⁸ That is, those investigating the NUMEC affair did not know in the 1960s and the 1970s how easy and reliable it was to identify the enrichment level of minute quantities of uranium discovered in the environment and then tie that uranium to the Portsmouth enrichment facility.

Typical of Giller's approach to the NUMEC affair was an interview he gave to John Fialka of the *Washington Star* in early August 1977, shortly after his testimony before Dingell's committee and not long after Shackley evidently told him about the Portsmouth HEU found near Dimona and other HUMINT connecting NUMEC to HEU in Israel.

What I have said is there is no conclusive evidence that any materials have been diverted from U.S. facilities, and I don't think there is anyone in the intelligence community that is prepared to challenge that... . Some individuals at CIA may have reached a different conclusion, but they have only looked at one piece of the puzzle... . I have reason to believe I know everything.⁵⁸⁹

Giller did not tell the IG investigators of his potential conflict of interest with respect to the conclusions advanced by Shackley, Duckett and others at CIA. He failed to disclose that he went to work for the CIA in 1960 on assignment from the Air Force at the request of "my friend [Herbert] Pete Scoville."^{590, 38} In 1962, he became Scoville's deputy

when Scoville became CIA's deputy director for research. When Scoville left CIA in 1963 to join the Arms Control and Disarmament Agency, Giller stayed with CIA for another year as deputy to Dr. Albert Wheelon, who headed CIA's newly named directorate of science and technology. Carl Duckett succeeded Wheelon in 1965. Thus, when Giller speciously countered the arguments of CIA, he was disputing his successors at CIA. His failure to disclose this past association to the investigators while he was discrediting the people who then occupied his old office raises the possibility that he had an ulterior motive, perhaps one as simple as professional jealousy. Whatever it was, he should have disclosed the association.

On May 19, 1978, two weeks after their interview of Giller, DOE's IG investigators Anderson and Knauf interviewed Robert Fri, the former acting administrator of ERDA.⁵⁹¹ Fri told them, "the 1965 NUMEC special nuclear material inventory difference issue came to his attention on three occasions" while he was with ERDA. He said the first occasion was in the spring or early summer of 1976 when James Connor, an aide to President Ford, asked for NUMEC files. The second occasion was when he observed a briefing that Marcus Rowden provided to the NSC staff on the pending release of the Strategic Nuclear Material Inventory Difference Report, and the third was when he personally reviewed the NUMEC documents before approving the 1977 release of that report.

Fri said the Rowden briefing occurred in Zbigniew Brzezinski's office at a meeting in which Enno Knoche described CIA's conclusions regarding NUMEC. Fri listed NSC staff members attending the meeting as Dave Elliott and Jessica Tuchman. Fri said that Rowden told the NSC staffers "what the White House and Mr. Brzezinski should be aware of regarding the NUMEC issue" in light of the pending release of the Strategic Nuclear Material Inventory Difference [ID] Report. Fri did not recount what Rowden said about NUMEC; instead, he described what Knoche, the deputy director of central intelligence, told the group. DOE redacted his description of Knoche's information when it released the summary of his interview by IG staff.

Fri told the IG staff that "he heard from three CIA officials on three separate occasions" about NUMEC.

Fri said his second CIA briefing was given by Mr. Ted Shackley, who came over during the drafting of the ERDA ID report [ERDA-7768]. He recalled that Mr. Shackley brought along some type of chronology, "the kind of document one would bring to make a point." He said he did not feel that the CIA was holding back on anything, but that all the data they had was circumstantial. [25 lines redacted].

Fri did not tell the IG investigators anything about the third encounter that he said he had with CIA concerning NUMEC. It may have been the meeting with Brent Scowcroft in April 1976 that Giller recounted. Instead, Fri proceeded to recite the decade-old AEC explanation for the missing U-235, i.e., it could not be found because of sloppy accounting and was likely held up in the scrap processing line at Apollo where it adhered to pipes and filters.

Eleven days after interviewing Fri, the two IG investigators turned their attention to

General Alfred Starbird who had retired from ERDA.⁵⁹² He told them that he accompanied Giller at the Rowden briefing in 1976 and joined Fri and Giller at the Shackley briefing in the summer of 1977. Starbird brought his personal attorney to the interview. He began by telling the investigators of the review he conducted relative to NUMEC in preparing for his high level review of the inventory difference report in the summer of 1977. His review included AEC documents describing the 1965 AEC investigation of NUMEC, interviews of ERDA staff that had been involved in that investigation, and examination of GAO and FBI investigations. He defended current safeguards as being superior to those in existence in the mid-1960s. He said that his review of these matters and his consideration of information presented by CIA led him to conclude, “that a significant amount of SNM had never been stolen from NUMEC.” He cautioned, however, “That any interpretation of the AEC/ERDA position on this question should not misconstrue his statements to mean he was ‘certain’ that no diversion had ever occurred.”

Starbird described the briefing by Shackley and said Shackley showed him, Fri and Giller a talking paper [fifteen lines redacted].

Starbird ended his IG interview with a long explanation of why previous written answers he provided to Dingell about his NUMEC-related testimony were nonresponsive, i.e., he was the victim of inept subordinates.

The IG investigators conducted a second interview of Fri on March 8, 1979, ten months after his first interview.⁵⁹³ The DOE redacted much of the record of that interview before it was released. The unredacted information did not add much to the summary of Fri’s first interview. Fri said that he did not view Knoche’s briefing in 1977 as the official position of the CIA. One is left to wonder how much more official a CIA statement has to be than the words of the Deputy DCI in a closed meeting in the office of the National Security Advisor describing SECRET/SENSITIVE National Security Information.

Based on the interviews by Anderson and Knauf, the Inspector General’s office of DOE on April 27, 1979 told DOE Undersecretary John Deutch that Fri “made a knowing misstatement of actual knowledge” to Dingell on August 8, 1977 by denying he knew of the views of a U.S. intelligence agency on the alleged diversion of SNM from Apollo in the mid-sixties. That same day the Department of Justice found there was insufficient evidence to justify prosecuting Fri for a “knowing misstatement” to Congress.⁵⁹⁴

At least one person lost his job at DOE in the aftermath of the Fri investigation. Harvey E. Lyon, long-time head of ERDA and DOE’s Office of Security, was the person who originally refused to grant Jim Conran access to NUMEC files. Lyon also helped prepare Fri’s 1977 testimony to the Dingell and Udall committees. He resigned from DOE in January 1979 amid rumors he had been fired. His boss, Duane Sewell, DOE assistant secretary for defense programs, refused to comment on the reasons for Lyon’s departure, while Lyon said he was offered another position in an ongoing reorganization and “didn’t want it.”⁵⁹⁵

Henry Myers recalled that in 1978 the Defense Science Board assigned John Deutch, then serving as undersecretary of energy, to perform an “all sources” review of the NUMEC affair. Myers noted, “In so doing he has seen materials not available to us.” Deutch promised to tell Congressman Udall the results of his review, but he never did.⁵⁹⁶

On June 22, 1979, Michael McNulty warned Udall that Shapiro’s lawyers were “feeling the heat ... with some sort of FBI investigation now breathing down their neck, the precariousness of Shapiro’s situation is causing them a lot of anxiety ... now that they may be going to a grand jury; and so they’re going to jump on Henry [Myers].” McNulty urged Udall to be short and to the point with Shapiro’s lawyers in their efforts to stem the tide of damaging documents that were flowing to the press.⁵⁹⁷

The press accounts of growing evidence of a diversion from Apollo apparently did not faze former AEC Chairman—he said he heard it all before when he corroborated the public statements of Fialka, *Newsweek* and other journalists concerning CIA’s 1968 discovery of HEU near Dimona. Seaborg said, in reference to the various newspaper articles about NUMEC that appeared in 1979, “these accounts as far as I have read them, revealed without gross inaccuracies much of what had occurred.”⁵⁹⁸

Journalists Steve Weissman and Herbert Krosney, who relied mainly on interviews with government officials in the U.S. and the Middle East for their 1981 book on the Islamic bomb, also described CIA’s 1968 discovery of HEU in Israel. They went further than others in concluding that such material was used in Israel’s first atom bombs.⁵⁹⁹

Duckett stated in his briefing that the CIA had varied evidence for its 1968 report... . The CIA had also followed up a disturbing rumor. American scientists returning from Israel were worried over signs that the Israelis appeared to be working with bomb-grade highly enriched uranium. The scientists informed the CIA, and the CIA put to work some highly sophisticated equipment to monitor air and soil samples from around Israel’s nuclear facility at Dimona. The “sniffers” and other instruments proved what the CIA most feared: Israel had highly enriched uranium, and the CIA concluded that Israel had enough of it to make several bombs... . When the CIA first reported that Israel had nuclear weapons in 1968, they apparently knew little or nothing of the French plutonium. What they did know was that Israel had the other bomb material, highly enriched uranium. Their “sniffers” and other fancy instruments had found unquestionable traces of it in waste taken from Dimona... . Agency officials were convinced that Shapiro and NUMEC had supplied Israel with more than 200 pounds of highly enriched uranium, or enough for several atomic bombs.

Carl Duckett took a long time before he told anyone outside CIA that the Agency found traces of Portsmouth uranium in the environment near Dimona. Finally, in 1991, he

discussed CIA's 1968 discovery with investigative journalist Seymour Hersh. However, Hersh claimed that the uranium found by CIA near Dimona could not be associated with NUMEC. "Duckett and other government investigators into NUMEC acknowledged that there is no meaningful correlation between uranium processed in the NUMEC plant and the traces of enriched uranium picked up by the American agents outside Dimona."⁶⁰⁰ If Duckett said this to Hersh, he was wrong.

A statement of "no meaningful correlation" is not correct. The science of nuclear forensics had been around for twenty years by the time it was applied at Dimona. U.S. intelligence agencies, including AEC, started working with nuclear forensics immediately after World War II. They applied scientific methods at increasing levels of sophistication to diagnose nuclear operations and experiments by other nations, both friend and foe.⁶⁰¹ In the case of highly enriched uranium near Dimona, the forensic analysis no doubt began with the fact that only five countries could enrich uranium in 1968, namely, France, England, Russia, China and the United States. Although the enrichment facilities in those countries were similar, they had unique design characteristics and unique enrichment capabilities. Therefore, the mixtures of uranium isotopes that they produced were also unique. However, because the operating cycles of enrichment plants frequently vary, it is difficult to distinguish a particular source of enrichment by gaseous diffusion. Nevertheless, attention would have focused quickly on the three U.S. gaseous diffusion plants. Then, the analysis would have centered on the Portsmouth plant that, beginning in 1964, was the sole source of 97.7 percent enriched uranium. Thus, any traces of that uranium found near Dimona had to have come from one of the companies that processed it into naval reactor fuel. NUMEC's Apollo plant was the leading candidate among the small number and size of such companies because of the relatively high volume of naval fuel it processed compared to the other plants, its historically high losses of HEU, and its close ties with Israel.

Contrary to Hersh's claim of "no meaningful correlation," there is proof that ERDA staff (and its predecessor AEC staff) knew that spectrographic analysis could establish the signature of highly enriched uranium near Dimona. That proof is evidenced by ERDA's reply to an inquiry from the FBI in 1976, not long after Duckett briefed NRC. Sam McDowell of the ERDA staff (the AEC official that signed the 1966 final report of AEC's investigation of the missing HEU at Apollo) recorded his conversation with the FBI special agent as follows:⁶⁰²

On May 20, 1976, the writer met with (redacted) in Rm A2 1304 [an office in the Germantown, MD headquarters of AEC]. (Redacted) asked what technique might be available to determine whether enriched uranium if such can be obtained from the Israelis could be traced to material from the Numec facility during the 1963-1965 time frame. The writer told (redacted) that two possibilities exist. One is comparison of the mass spectrometer data including minor isotopes of the Israeli material with reference to cascade mass spectrometer data on file at Oak Ridge for the same period. The second possibility would be to relocate any of the WANL fuel rods or elements containing the

Numec material. There is a good chance that some of these may exist at Nevada, Idaho or Los Alamos. This is now being checked out. If located, the material could then be compared with the Israeli material, if such material can be obtained.

Although McDowell focused his answer to the FBI on the Oak Ridge enrichment plant because the Astronuclear (he called it WANL) uranium was enriched there, it is clear from his description of the technology that it was equally applicable to uranium enriched at Portsmouth. No record has been found to show whether McDowell knew of the HEU with a Portsmouth signature found near Dimona. It is noteworthy that CIA apparently found that unique HEU eight years earlier than this FBI query of McDowell. However, CIA, by its own records cited above, admitted it did not tell FBI the details of what they found until the 1970s when Conran's whistleblowing caused the attorney general to renew the FBI investigation. If so, then the FBI inquiry of McDowell might have been simply to confirm what CIA had concluded in 1976; i.e., it was possible to trace the origins of HEU with the unique signature of Portsmouth by spectrographic analysis.

On May 28, the Special Agent in Charge of the Washington Field Office sent a Top Secret Teletype to the FBI Director giving the FBI's version of the meeting with McDowell eight days before.⁶⁰³

On May 27, 1976 (redacted, but probably McDowell) ERDA, Germantown, Maryland, advised that detailed information pertaining to analysis of material processed at NUMEC during the early 1960's is on file at Oak Ridge and [Los Alamos], but cannot be removed from their libraries. Also actual material in the form of reactor rods probably can be retrieved from installations in the United States. (Nine lines redacted.)"

Nothing has been found in later FBI memoranda and letters on NUMEC to indicate that FBI pursued this line of investigation. However, many FBI documents subsequent to this one were almost completely redacted before release.

Modern day uses of "signature" technology include deployment of sensitive detection capabilities by the United States for monitoring materials and effluents from nuclear facilities around the globe. The IAEA also uses this technology.⁶⁰⁴ As reported by nuclear experts Thomas Reed and Danny Stillman, "Should a nuclear device detonate by surprise anywhere in the world, the forensic scientists of the nuclear weapons community will be able to identify the source of the fissile material within a few hours. The nuclear weapons states and the IAEA have built an excellent library of nuclear fingerprints that precludes anonymity."⁶⁰⁵

Duckett was the former chief scientific officer of CIA. He led the Agency's tracking of Soviet nuclear strike capabilities for much of the 1960s and 1970s. He had to have known about nuclear forensics. Therefore, either Hersh misquoted or misunderstood Duckett or Duckett misled Hersh. Independent of Hersh's rendition of the exchange between the two of them, by the late 1970s, Seaborg, Knauf, Anderson, Starbird and probably most of the other people that Shackley briefed in 1977, if not every one, knew of CIA's 1968 discovery near Dimona of HEU with a Portsmouth signature.

In addition to there being a number of sources for the fact that Portsmouth HEU was discovered by the CIA in the environment near Dimona, there were also a number of journalists that wrote about that discovery (Hersh, Fialka, the Cockburns, *Newsweek*, and Weissman and Krosney). In addition, no one has suggested in more than 45 years that there was any other reason for the 1968 CIA request that FBI renew its investigation of NUMEC or the much later 1976 FBI query of ERDA on how to interpret uranium enrichment signatures.

Nevertheless, there is some uncertainty in the evidence supporting this fact. That is, no NRC commissioner or staffer has ever said that they were told by CIA of its 1968 discovery, near Dimona, of HEU with a Portsmouth signature. Such evidence, when viewed by technical experts at NRC, should have constituted strong evidence, if not proof, of a diversion from NUMEC to Israel. No one at NRC has ever claimed to have such proof. Instead, NRC has been content to say it had “no conclusive evidence,” as NRC Chairman Hendrie put it, of a diversion. The lack of an NRC source for CIA’s claim that it found Portsmouth HEU near Dimona is intriguing. It is clear that Duckett did not tell NRC of this evidence. In their interviews by McTiernan regarding the Duckett briefing in February 1976, Commissioners Mason and Gilinsky (the only commissioners with technical qualifications at that time) said there was no spectrographic information conveyed by Duckett. Mason went further.⁶⁰⁶

When asked whether there was anything by way of a “fingerprint” (i.e., spectrographic analysis) linking Apollo material with anything that was in Israel, Dr. Mason emphatically answered that there was no such reference. That was precisely the sort of hard evidence that he was expecting to hear, and nothing of the kind was presented.

Kenneth Chapman, director of NRC’s Office of Nuclear Material Safety and Safeguards and Builder’s boss, identified several items alleged in the press that were not contained in Duckett’s briefing. He said, “neither Mr. Helms nor the President were mentioned; there was no mention of the classification level of the briefing, other than it had ‘sensitivity’; details printed in later Fialka articles were not given, i.e., monitors, encoded phones, etc.; and there was no mention of the FBI.”⁶⁰⁷ Chapman said there were no “monitors.” Thus, as far as Chapman recalled, Duckett did not tell NRC anything about monitors.

Later, Gilinsky recalled hearing that CIA radiation monitors found HEU near Dimona, but could not recall where, perhaps at the Department of State sometime after the Duckett briefing.⁶⁰⁸ Apparently Shackley did not tell the NRC people about Portsmouth HEU when he briefed them on February 2, 1978.

On August 3, 1978, John Fialka reported that NRC investigator McTiernan had written a long memorandum to the NRC commissioners when he retired in July. McTiernan told the commissioners, “there is an aura or atmosphere about NUMEC/Apollo that leaves one with a strange feeling that there is some kind of story to be told, something that, for some reason, has not yet been said. I don’t know whether there is such a story,

but, looking back, there are certain questions that now cross my mind.” McTiernan went on to say that Shapiro, “should be given an opportunity, if he chooses, to answer publicly the shadowy charges that have been leveled against him over these many years.”⁶⁰⁹

³³ It is not clear from McTiernan’s summary whether Duckett referred to the Plumbat affair in 1968, which involved 200 tons of Belgian yellowcake via Germany, or Argentina’s 1963 direct sale of 80 to 100 tons of yellowcake to Israel.

³⁴ This person would have been James Lovett, an AEC materials expert, not the chief of AEC’s investigation. Shapiro hired Lovett to improve material control and accounting at NUMEC shortly after the 1965 AEC investigation. From the summary of his remarks, it is unclear when Duckett referred to the MUF at NUMEC whether he meant the large inventory difference that accumulated by 1968, the inventory difference AEC found in 1965, or the unexplained portion of the 1965 inventory difference. Whichever it was, he thought it was “undue.”

³⁵ Edward Bennett Williams, who represented Shapiro in his quest for an AEC Sigma clearance in 1970, did not represent him in this instance. It may have been a matter of costs. Hadrian Katz of Arnold & Porter told Senator Arlen Specter (D-PA) in 2009 that Shapiro was “our long-time pro bono client and friend.”

³⁶ ISORAD continued in operation into the 21st Century, providing Israeli nuclear knowhow to foreign clients.

³⁷ *Aliyah* or *aliya* is enshrined in Israel’s Law of Return that accords any Jew the legal right to assisted immigration and settlement in Israel, as well as automatic Israeli citizenship.

³⁸ From 1955 to 1963, Scoville served as Deputy Director for Research at CIA. He helped develop technology required for independent verification of nuclear weapons capabilities without on-site inspection. He left CIA in 1963 to become assistant director for science and technology at the Arms Control and Disarmament Agency where he helped formulate U.S. positions for the Limited Test Ban Treaty and the Non-Proliferation Treaty.

Chapter 14

CIA Hydra (1979)

The Central Intelligence Agency was associated with the NUMEC affair in various ways. However, it is difficult to know CIA's roles in detail because it is a secret agency, the events of interest are decades old and the Agency is not telling everything it knows. The possibilities for CIA's involvement range from simple observer of the facts in America, to espionage in Israel to covert operations at home and abroad.

Five CIA employees are known to have figured significantly in the NUMEC affair. The five made inconsistent and contradictory statements about the possibility of a diversion of HEU to Israel. Thus, one or more of the five may have lied about what they knew because they had no fear of punishment or they had sworn to protect official secrets. The purpose of this chapter is to elaborate the character and career of these five to aid in deciding whom to believe.

In the case of NUMEC, numerous records exist to help sort out which of the five CIA officials to believe. The records include nearly 50 years of official but redacted records of the responsible government agencies, books by historians who interviewed scores of people and combed through reams of paper, admissions by historical persons in their memoirs, and newspaper accounts based on confidential statements of sources that were knowledgeable of the facts.

In deciding whom and what to believe, it is important to remember that interagency rivalries played a part in the NUMEC investigations. One Congressional investigator who read the Senate and House Intelligence Committee files on NUMEC told Hersh that Helms and Hoover sparred over the case for over a year. "The CIA was saying to Hoover, 'you're responsible for counterintelligence in America. Investigate Shapiro, and if he's a spy, catch him.' Hoover's answer was, 'we don't really know if anything's been taken. Go to Israel and get inside Dimona, and if you find evidence of the Shapiro uranium, let us know.' It was a kind of a game. The memos were hysterical—they went back and forth."⁶¹⁰

The Five senior employees of CIA who are known to have had a significant connection with or interest in Israel and NUMEC were James Angleton, Carl Duckett, John Hadden, Richard Helms and Theodore Shackley. Angleton and Helms were described briefly in earlier chapters and that information is not repeated here. This chapter provides more information about the lives of Duckett, Hadden, Helms and Shackley to aid in interpreting their role and credibility. The things that all five said about Israel and the bomb and about NUMEC are summarized.

James Jesus Angleton

Although much has been written about what Mossad did for CIA, not much has been said about what CIA's consummate counterspy might have done for Israel. His contributions must have been substantial because in November 1987, a year after his death, the Israelis dedicated a memorial forest in the Jerusalem corridor to his name and

erected a large stone monument near the King David Hotel in Jerusalem where he stayed when visiting his Israeli counterparts. The monument bears an inscription in English, Arabic and Hebrew “IN MEMORY OF A DEAR FRIEND, JAMES (JIM) ANGLETON.” In addition to the past and current heads of Israeli intelligence and defense organizations and Jerusalem Mayor Teddy Kollek, the U.S. Ambassador Thomas Pickering and Angleton’s wife and daughters attended the dedication of the forest and the monument.⁶¹¹

In managing CIA’s interface with Israel, Angleton had the capability to withhold information from others about developments in the Israeli nuclear weapons program. To do so would have given his Israeli friends a better chance to get the job done (e.g., constructing Dimona while negotiating for conventional American arms) without U.S. interference. Journalist Seymour Hersh said, “Angleton’s close ties with the Deshalit family and others in Israel made it inevitable that he would learn about the construction [of Dimona] in the Negev. One senior official recalled that Angleton’s first intelligence report on Israel’s plans to build the bomb was filed routinely in the late 1950s.”⁶¹² Whether he provided other assistance to the Israeli nuclear program is a matter of conjecture.

John Hadden lost respect for Angleton.⁶¹³ Perhaps his animosity stemmed from Angleton’s oversight of CIA’s Israel connection. As British superspy Peter Wright put it, “[Angleton] controlled the Israeli account and made the CIA station in Tel Aviv redundant.” Since Hadden was the station chief in Tel Aviv, he must have suffered from Angleton’s micromanagement. Furthermore, when Hadden ended his assignment in Tel Aviv he returned to Langley and reported to Angleton. Hadden’s son said that friction between the two led to Hadden’s retirement in 1973, a year before Angleton’s resignation. Those were tough times for both men. Wright recalled, “Angleton ... was drinking far more than was good for him, and had begun to look not merely pallid but genuinely ravaged... . He became increasingly introspective... . He seemed pent-up and aggressive, trusting fewer and fewer people... .”⁶¹⁴

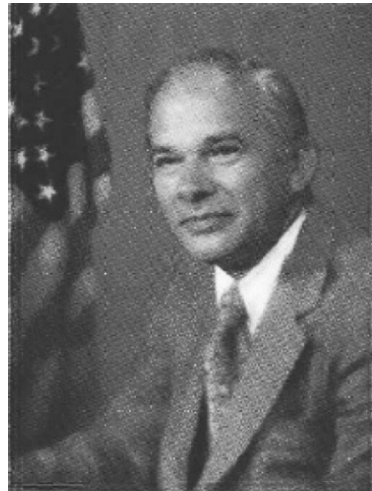
On August 5, 1977, Senator John Glenn asked Ted Shackley, “What did Jim Angleton have to do with the NUMEC matter?” Much of Shackley’s short answer was redacted when CIA released the document, but it had interesting implications. “Mr. Angleton was the Chief of the CI [Counter Intelligence] Staff (two lines redacted). As a result (name redacted) had worked for Mr. Angleton. In view of this situation Mr. Angleton had obviously been aware of and interested in (name redacted) activities.” The point was made that such activities “obviously focused on NUMEC (two lines redacted).” The name John Hadden fits well in the redacted names in Shackley’s notes of the Glenn briefing.

Carl Ernest Duckett

Carl Duckett was the principal spokesman for CIA on NUMEC. Some people, such as General Giller, thought Duckett might not have presented the official conclusions of CIA. Despite doubts by a few outsiders, the Agency had a number of good things to say about Duckett.⁶¹⁵

His CIA co-workers knew him as a “self-made” man because of his humble beginnings and his lack of a college degree. He was born in 1923, the fourth of seven

children fathered by a “professional mountaineer” in a small community ten miles from Asheville, North Carolina. He worked as a clerk in a grocery store after graduating from Swannanoa High School. In the spring of 1942, he enrolled in a crash course for electronics technicians in the civil service. The course was essentially equivalent to the first half on an engineering degree. He finished near the top of his class. He then took a job with Westinghouse to train military personnel in the use of a radar system that saw wide application during World War II.



Carl E. Duckett
U.S. Army
1944-1962
CIA Deputy Director
Directorate of Science & Technology
1963-1977

In 1944, Westinghouse assigned Duckett to a team to integrate radar with a 90-mm gun and an analog computer. The team deployed to England where this unique antiaircraft system proved to be the most advanced weapon available for intercepting Germany’s V-1 buzz bombs. He returned to the U.S. in August 1944 and received his draft notice two months later. The Army assigned him to advanced radar work at the MIT radiation laboratory after an IQ test showed he had exceptional scientific ability. He soon rose to the rank of Master Sergeant and set out for the Pacific to test a target indicator to protect warships from Japanese kamikazes. He returned to Westinghouse at the end of the war and deployed to White Sands Missile Test Range in New Mexico to participate in the first U.S. launch of a German V-2 rocket. He was discharged from the Army in 1946.

The Army recalled Duckett to active duty in 1950, promoted him to First Lieutenant and sent him to Signal Officer’s School in Fort Monmouth, New Jersey. He returned to White Sands to command the radar division at the test range. After discharge from the Army in 1953, he worked in range instrumentation at White Sands until 1956.

He participated in a committee that reviewed the adequacy of U.S. missile test ranges and then received an intelligence clearance to review aerial photography of Soviet missile test ranges. That assignment involved frequent contact with Army intelligence personnel in the Pentagon. In 1957, DCI Allen Dulles assigned Duckett to a group that reviewed U-2 photographs of the Soviet test range at Tyuratam, Kazakhstan. In that assignment, Duckett met Albert “Bud” Wheelon, who later became head of CIA’s first

Office of Scientific Intelligence.

Duckett organized and led the Army's first full-time missile intelligence unit at Redstone Arsenal. In that capacity, he went to Washington in 1962 to help CIA identify intermediate-range missiles in U-2 photos of Cuba. Subsequently, at a U.S. Intelligence Board (USIB) review of Chinese Strategic Weapons, Duckett's presentation led to the revision of a National Intelligence Estimate. DCI McCone chaired the USIB at the time and was so impressed by Duckett's presentation that he ordered CIA to hire him to set up a Foreign Missile and Space Analysis Center.

Bud Wheelon was Duckett's first boss at CIA. As CIA's top analyst on foreign missile and space matters Duckett had access to U-2 photographs of the Dimona reactor. By the mid 1960s, in addition to other duties, he was CIA's expert on the Israeli atom bomb program.⁶¹⁶

DCI McCone named thirty-three year old Wheelon as the first director of CIA's directorate of science and technology, replacing Herbert Scoville, the former deputy director of research, who left CIA to join the Arms Control and Disarmament Agency.⁶¹⁷ Wheelon selected Duckett to be associate deputy director of DS&T. When Wheelon left CIA for a job with Hughes Aircraft in September 1966, Duckett assumed command of the directorate in an "acting" capacity. McCone and Helms later named Duckett to the permanent post in the spring of 1967.

He served as Deputy Director of CIA with oversight of DS&T, reporting directly to the DCI, until 1976. During his tenure, the directorate relinquished its role over aerial reconnaissance to the Air Force but achieved its peak of power and influence within the Agency. Dino Brugioni described Duckett as a man who "could turn technical data into laymanese." Another senior CIA official said Duckett was "probably the best marketer," a man who "could sell Congress anything."

In 1968, a Soviet diesel-driven submarine sank in the Pacific Ocean. It was armed with nuclear ballistic missiles. The U.S. Navy used a secret computerized tracking system to find the wreckage about 1700 miles from Hawaii. The Navy's underwater Sound Surveillance System pinpointed the site with sufficient accuracy to permit the USS *Halibut* to find and photograph the wreckage. Duckett proposed an expedition to the bottom of the sea to recover the submarine, its cipher materials and its three missiles, each tipped with a four-megaton nuclear warhead. CIA contracted with Howard Hughes to build an enormous recovery ship called the *Glomar Explorer* at a cost of \$70 million. The ship was longer than two football fields, and its design included a 300-foot underwater barge for resting any recovered wreckage and a roof over the lifting crane to prevent Soviet surveillance.

In 1974, the *Explorer*'s first attempt to recover the sunken Soviet sub was only partially successful in learning its nuclear secrets because the sub broke apart while ascending to the surface, and large pieces fell back to the ocean floor. Two nuclear torpedoes and a journal of naval operating instructions were the primary catch. In 1975 the cover story for a follow-on operation was blown when, in the course of a burglary investigation, FBI Director Kelley disclosed the project to a friend in the Los Angeles police department who told a subordinate who went to the press.⁶¹⁸ The walls really do

have ears.

Duckett frequently attended meetings of the National Security Council during the Ford administration in connection with the Strategic Arms Limitation Treaty then being negotiated with the Soviet Union. President Ford, Vice President Nelson Rockefeller, Secretary of Defense James Schlesinger, Arms Control and Disarmament Director Fred Ikle, the Chairman of the Joint Chiefs of Staff and the DCI typically attended such NSC meetings. Other attendees usually numbered five or six, including Duckett and assistants to the president, such as Brent Scowcroft, Donald Rumsfeld and Richard Cheney. Duckett was on a first name basis with the NSC members. They relied on his expertise concerning the capabilities and deployment of various Soviet nuclear armaments and their delivery systems.⁶¹⁹

Duckett's scientific abilities aided Helms throughout his tenure as DCI. Helms assigned Duckett to help Kissinger understand the technical issues of nuclear detente. Kissinger came to call him "professor" because of his ability to explain technical matters to laymen. Duckett later recalled his relationship with Kissinger.⁶²⁰

What was difficult was when you have the national security advisor saying, "Look, the president of the United States and secretary of defense have said the following. Now, are you telling me that you are going to argue with them?" And the answer was, "No sir, I'm not going to argue with them, other than to tell you that they're wrong." But that's when a senior intelligence officer ... has to be prepared to say, the fact is, we do have enough information ... and in this case, we felt the technical argument was overwhelming.

By 1972, Duckett was in charge of a worldwide enterprise with several generations of spacecraft spying from orbit, U-2s still on patrol and electronic eavesdropping churning out intercepted Soviet missile telemetry. He had numerous divisions under his command: Computer Services, Special Projects, Special Activities, Research and Development, Electronic Intelligence, Scientific Intelligence, the National Photographic Interpretation Center and FMSAC.⁶²¹

In 1973, CIA awarded Duckett a Distinguished Intelligence Medal. The award cited him as a key expert in the field of foreign scientific and technological affairs and acknowledged his important role in the achievement of strategic arms limitations with the Soviet Union. It also mentioned his exceptional managerial talents and resourcefulness in improving intelligence collection methods.⁶²² In 1976, Duckett received a second Distinguished Intelligence Medal. DCI William Colby presented the award for service as "Program Director of a major undertaking of the utmost importance to the United States." Colby was less discreet in his impromptu remarks. "This medal is really given to you with the warmest of admiration of all of us for a great job. Despite the fact that the citation didn't say so, it had something to do with a boat which Carl still owns."⁶²³ The boat was the *Glomar Explorer*.

The next month, Duckett briefed NRC on Israeli nuclear weapons and their relationship to NUMEC.

Acknowledgement of Duckett's alcoholism is important in judging his credibility. Colleagues reasoned that Duckett's problems with the bottle stemmed from family problems and his disappointment at not being considered for the DCI post. According to DCI Bush's Deputy Director for Intelligence, Sayre Stevens, Bush "treated Carl delicately, with genuine concern," and "gave Carl every chance in the world." After his resignation, Duckett acknowledged a discussion with Bush about the drinking problem but claimed Bush's refusal to consider him for promotion was the real reason for his leaving the Agency.⁶²⁴

A former colleague of Duckett has offered the following unsolicited statement on Duckett's character:⁶²⁵

There was an effort, almost certainly approved at a high level, that followed Duckett's revelations to discredit him and dismiss his charges as the ravings of a drunk. I knew Carl as long ago as 1960, when he was working for the U.S. Army at Redstone Arsenal, and I was an army captain working as a photo-interpreter in Washington. Carl was in charge of an interagency effort to figure out what the Soviets were doing with their medium and intermediate range missile programs... . Carl was a competent and thoughtful manager then, with great integrity, and it was no surprise to me when he eventually became the CIA's chief scientist. If he enjoyed a drink from time to time, I doubt that it would have ever influenced his judgment or critical thinking.

In 1981 Duckett appeared with former CIA analyst David Comer and others on *Closeup*, a television program produced by ABC News. Comer said that he participated in the formulation of a National Intelligence Estimate in the 1950s from which "a policy emerged ... that the Israelis who were a very capable crew were one of the more likely proliferators." Shimon Perez then told the *Closeup* audience how the U.S. accepted Israel's ambiguous promise "not to be the first to introduce nuclear weapons into the Middle East" as an acceptable basis for providing sophisticated armaments for Israel's defense. Then Yuval Ne'eman joked with his *Closeup* interviewer about the possibility that HEU had been stolen from Apollo, but when pressed on the issue said, "I don't know that story. I'm sure it didn't end up in Israel, but I have nothing to do with this aspect of the story." Then Duckett came on the screen and said CIA "finally became confident that the diverted material from NUMEC went to Israeli nuclear devices." Duckett went on to tell the *Closeup* audience, "all of my senior analysts who worked on the problem agreed with me fully; if not, it was their responsibility to tell me so. So yes, I think that the clear consensus in CIA was indeed NUMEC material had been diverted and used by the Israelis in fabricating weapons." In commenting on the 1968 National Intelligence Estimate that flowed from the conclusion of his analysts, Duckett said "Director Helms told me President Johnson said 'don't tell anybody else, don't even tell Dean Rusk or Bob McNamara.' I guess the key impression to me was that indeed it was taken very seriously by the President, and obviously he was very concerned that we protect that information."⁶²⁶

Some people have claimed that Duckett's conclusions about the nexus between Israel's first nuclear weapons and the uranium missing from Apollo were his alone and did

not represent an official position of CIA. Their claims do not jibe with the evidence that three DCIs, one deputy DCI and an Associate Deputy Director of Operations endorsed Duckett's conclusions. Duckett cited the following concurring opinions in a letter to Morris Udall on November 7, 1978 that was provided to the press in January 1979:⁶²⁷

- DCI William Colby sent a letter to President Ford on the subject, and
- DCI George H. W. Bush accompanied Duckett when he briefed the subject for Senator Howard Baker, who was then the senior Republican on the Joint Committee.

Records show the following additional concurrences by high CIA officials in Duckett's conclusions about NUMEC:

- DCI Richard Helms took Duckett's conclusions to Attorney General Ramsey Clark, AEC Chairman Seaborg and President Johnson in 1968;
- Deputy DCI Enno Knoche told DOE officials of CIA's conclusions in the office of Zbigniew K. Brzezinski, Assistant to the President for National Security in April 1977;
- Three months later, CIA's Associate Deputy Director of Operations, Ted Shackley, provided those same DOE officials with the technical details that underpinned CIA's conclusions; and
- In the summer of 1977, Shackley took the same briefing to numerous Congressmen, staff and the NSC.

In 1991, Duckett granted a wide-ranging interview to Seymour Hersh. He told Hersh that Edward Teller's conclusion in the late 1960s that the Israelis had the bomb but did not intend to test it "was the single most convincing piece of evidence I got the whole time I was in CIA." Duckett also said he told Congressional investigators that NUMEC was formed in 1957 by Shapiro as part of a long-range Israeli intelligence scheme to divert uranium. Hersh reported that Duckett, Helms and CIA's station chief in Israel, John Hadden, shared the view that Shapiro had to have been the source for the Israeli progress in nuclear weapons.

Although Duckett acknowledged to Hersh that CIA operatives in Israel had found "traces of enriched uranium" near Dimona in 1968 that was similar to the enriched products that had been delivered for processing to Shapiro's plant, he told Hersh that such a correlation was not meaningful. On that latter score, either Duckett erred or Hersh misunderstood. If the uranium found near Dimona was 97.7 percent enriched, it had to have come from Portsmouth. The science for determining radiological signatures of environmental samples of nuclear materials (nuclear forensics) was well established by 1968. Duckett surely knew that science, while Hersh evidently did not.

Hersh also said that Duckett, in the 1991 interview, recanted many of his previous assertions. Hersh quoted him as saying "With all the grief I've caused, I know of nothing at all to indicate that Shapiro was guilty. There's circumstantial information, but I have never attempted to make a judgment on this. At no point did I have any vested interest in

this whole process. It was a matter of trying to be sure when you had information that you passed it along. Ultimately, you have no control over the information. I never met Shapiro and at no point was I interested in peddling the story.”⁶²⁸ The interview with Hersh was Duckett’s last public word on the matter.³⁹ Clearly in his interview with Hersh, Duckett contradicted some of what he said on the national broadcast of the ABC *Closeup* program 10 years earlier. Another way to interpret what Duckett told Hersh, which resolves some of the contradictions, is that Duckett was sure that a diversion occurred (as confirmed by finding the Portsmouth HEU near Dimona), but he was less certain that Shapiro was directly involved.

In 1991, CIA named one of its headquarters office buildings at Langley the Dirks-Duckett Wing after Duckett and Leslie C. Dirks, the man who succeeded him as Deputy Director of CIA for Science and Technology.⁶²⁹ Duckett died in 1992. Four years later, on September 18, 1997, his colleagues selected him as one of 50 Trailblazers to be recognized at the Agency’s 50th anniversary. The CIA-50 Steering Committee, comprised of officers from across the Agency, created the Trailblazer Award as a way to recognize CIA employees, from OSS days to 1997, whose action, example, innovation or initiative had taken CIA in important new directions and helped shape the Agency’s history.⁶³⁰

In a 2002 interview with a reporter from a Pittsburgh area newspaper, former Congressional staffer Henry Myers opined on Duckett’s role in the NUMEC affair. “Why would Duckett lie? Why was he going public on television? He was a very conservative bureaucrat. All this did was get him in trouble in life. The thing about Duckett is he had no reason to lie.”⁶³¹

John Lloyd Hadden

John Hadden was born on August 30, 1923 in New York City.⁶³² His father was Gavin Hadden, a structural engineer, civilian employee of the Army Corps of Engineers, confidant of General Leslie Groves and the official historian of the Manhattan project.⁶³³ His mother was the daughter of an Episcopal bishop of New York. His family remembers John as a charmer and good with languages. He studied engineering for a year at Harvard and then graduated from West Point in 1945 with a civil engineering degree.

Hadden attained an officer’s commission with the Army Corps of Engineers and was assigned to rebuild bridges and roads in post-war Germany. He also built an airstrip in Frankfurt for Air Force General Curtis LeMay.

His father introduced John to General Groves who wanted John to go back to school for an advanced degree and then serve as a scientific spy on the Soviet Union. John demurred and left the army to join the fledgling CIA. He took an assignment in Berlin, a city he had grown to love during the war. He met his future wife Kathryn Falck in the CIA office in Berlin. John and Kathryn’s first child, John Jr., was born in Berlin in 1953.

After assignments in Hamburg and Salzburg, Hadden served as CIA station chief in the U.S. embassy in Tel Aviv from 1963 to 1967. He transferred to CIA headquarters in 1968 but returned to Israel frequently and was there most of 1969. After 1969, he worked directly for James Angleton, CIA’s chief of counterterrorism. He retired from the CIA in 1973.⁶³⁴



John L. Hadden
CIA Officer
1948-1973
Tel Aviv Station Chief
1963-1967

Hadden's office in Tel Aviv was the source of intelligence information upon which CIA based its advice to President Johnson in early 1967 about the looming crisis between Israel and neighboring Arab states and the likelihood that Israel would quickly prevail if the crisis came to war. Hadden may have been the conduit for the information that preserved Angleton's reputation and career for another seven years. In the ensuing Six-Day War, Hadden provided daily, first-hand battle accounts to CIA headquarters. Those accounts owed to his close working relationship with Mossad that afforded access to reports from the field.

Hadden's duties as station chief included keeping an eye on Dimona and Israel's development of nuclear weapons. He was unable to confirm as late as 1966 that the Dimona site included a reprocessing plant for extracting plutonium from the reactor's spent fuel. However, by 1967 he concluded that Israel had made progress in fabricating an atom bomb.⁶³⁵

Hadden reported the twists and turns of the Israeli nuclear weapons program to anxious ears in Washington. For example, he detected that Prime Minister Eshkol reduced the country's spending on nuclear weapons and that Minister of Defense Moshe Dyan had a nonchalant attitude toward the secret project, referring to it as "just another weapon."⁶³⁶ Hadden also helped other U.S. embassy personnel monitor the environment near Dimona, looking for the first telltales of plutonium production, only to find HEU from Portsmouth.

In 1977, four years after retiring from CIA, Hadden cooperated with various investigations of NUMEC. He suggested that the Israeli government had a mole inside AEC who protected Shapiro during the early investigations of a possible diversion from Apollo.⁶³⁷ He appeared to agree with Duckett when he told Congressional investigators, "NUMEC had been an Israeli operation from the beginning but the CIA had not been able to follow the money trail. The Agency thought NUMEC had been financed by the owner of Apollo steel mill, Israeli War of Independence veteran David Lowenthal." Hadden said that any suggestion that Angleton had actually helped the Israelis with the NUMEC

operation was “totally without foundation. But on the other hand, he [Angleton] had no interest in stopping” the Israeli operation. Hadden, who knew Angleton well, put it bluntly, “Why would someone whose whole life was dedicated to fighting communism have any interest in preventing a fiercely anti-communist nation getting the means to defend itself?”⁶³⁸

Henry Myers interviewed Hadden in May 1978 and reported his impressions to Congressman Udall.⁶³⁹ Myers said that although Hadden “was elliptical in manner, I inferred there is little doubt in his mind that a diversion did occur... . In recent weeks, he has met with Dingell and Glenn. In addition he talked to Dingell staff for more than 20 hours... . Dingell staff says that Hadden is authentic and that discussion with him is essential to gain an understanding of the affair.” Subsequently, Congressman Udall met with Hadden.

On June 26, 1979, the British Broadcast Corporation aired a TV program discussing Israel’s acquisition of the atom bomb.⁶⁴⁰ The program reviewed in some detail both the NUMEC affair and the Plumbat affair. In the broadcast, BBC reporter Tom Bower introduced John Hadden as a former CIA political officer in Tel Aviv who began investigating Israel’s nuclear weapons program in 1960. Bower summarized eight factors that convinced Hadden that Israel had embarked on a nuclear program, as follows:

1. The construction of facilities to produce and handle nuclear materials, like Dimona;
2. The development of weapons technology, especially the type which can carry tactical nuclear warheads;
3. The flow of key personnel, especially the number specializing in nuclear physics that had been trained in areas necessary for a weapons program;
4. The attitude of the leadership to the nuclear question—General Dayan has hinted that Israel should declare it has the bomb;
5. The armed forces had bought and developed a vehicle—the Jericho missile—that can deliver an atom bomb;
6. Existing planes have been specially adapted to carry atom bombs;
7. The delivery pattern of bombers on training runs—a plane’s flight on a nuclear attack varies from a conventional attack; and
8. Analysis of the air and water near nuclear installations for traces of bomb-grade uranium.

Hadden went on to say, “If I were an Israeli I would want the bomb. I think the Israelis would want to take out an insurance policy so that if the Arabs got it [the bomb] and if the Arabs used it they [the Israelis] would have something in their sling.” The BBC reporter then summarized some inadvertently released, classified information indicating that Israel’s first bombs were constructed of uranium obtained “partly by clandestine means,” to which Hadden commented, “I think the publication of highly classified

documents is a mistake.”

Hadden contributed to Avner Cohen’s 1998 seminal account of Israel’s nuclear weapons program. Cohen identified Hadden as being among those “who helped beyond the call of duty... . Among those people—I am honored to consider them friends—are ... Avraham Hermoni... Yuval Ne’eman ... John Hadden ... Paul Warnke.” Hadden was surely the unnamed source for a statement attributed by Cohen to “the CIA Station Chief in Tel Aviv” who said he never met with nor shared his insights with the U.S. inspection teams that periodically inspected Dimona.⁶⁴¹ Even though Hadden was strong in his conviction that Shapiro had aided the Israeli program, and Cohen was strong in his praise of Hadden, Cohen made no mention of NUMEC in his 1998 book.

Hadden told the Cockburns that John Kennedy was the last president to try to do something about the Israeli bomb.⁶⁴² “Kennedy really wanted to stop it, and he offered them conventional weapons (e.g., the Hawks [antiaircraft missiles]) as an inducement. But the Israelis were way ahead of us. They saw that if we were going to offer them arms to go easy on the bomb, once they had it, we were going to send them a lot more, for fear that they would use it.”

Hadden also appreciated the irony of Shapiro’s involvement with the Israeli superspies (Biegun and Eitan). In the BBC’s *Panorama* TV show in 1979 he noted, “Just imagine to yourself how much easier it would be to remove a pound or two of this or that at any one time ... as opposed to removing all at one blow 150 pounds of shouting and kicking Eichmann. You see, they are pretty good at removing things.”⁶⁴³

Peter Stockton said he met Hadden at a CIA safe house in Georgetown during the Dingell investigation of NUMEC. He quoted Hadden as saying, “Angleton was a big leaker” on NUMEC information. Stockton went on to describe a Hadden memo he saw at CIA, which said, “They did it.” The memo was in a binder of stuff, “one particular memo by Hadden, all taped together.”⁶⁴⁴ Stockton also told this story to journalist Scott Johnson in 2015. “[Hadden] would pull out a 2.5-foot makeshift scroll of paper that contained his case against NUMEC. This was before computers, and the thing was long and pasted together, and that was his evidence,” Stockton said. “We’d sit there in the safe house, and he’d read me portions of it.”⁶⁴⁵

Although the CIA has refused to acknowledge that a report of the type mentioned by Stockton ever existed, much less declassify it under the FOIA, Hadden told his son that there was such a report. On October 7, 2014, I met John Jr. in Vermont to discuss Hadden’s knowledge of the NUMEC affair and to review several boxes of documents that Hadden left when he died in May 2013. Included in the boxes was an envelope lettered “Washington Trip” in Hadden’s hand. Inside was a September 1, 1978 invitation from the DOE Inspector General asking him to come to the Germantown, Maryland office of DOE. He wanted Hadden “to meet with representatives of my office to discuss freely and in complete detail your knowledge of matters relating to your knowledge of Israel’s nuclear power capability... .”

The envelope also included a September 1, 1978 letter from DCI Stansfield Turner stating, “The scope of the Inspector General’s inquiry may encompass information which you have pledged not to reveal pursuant to the terms of the secrecy agreement which you

executed when you entered on duty with the Central Intelligence Agency. You are hereby released from the terms of that secrecy agreement, for the purpose of the Inspector General's inquiry, within the limitations set out below... . You may disclose classified information pertinent to specific intelligence sources or operational methods only with the express approval of my personal representative."

The envelope included handwritten notes on a three by five card and five sheets of yellow legal paper. The notes apparently were an outline of what Hadden told the Congressional investigators and the DOE Inspector General. A telephone number on the three by five card was for the private office of former DCI Richard Helms.

The information in Hadden's notes included the eight points he summarized for the BBC reporter in 1979 plus the following.

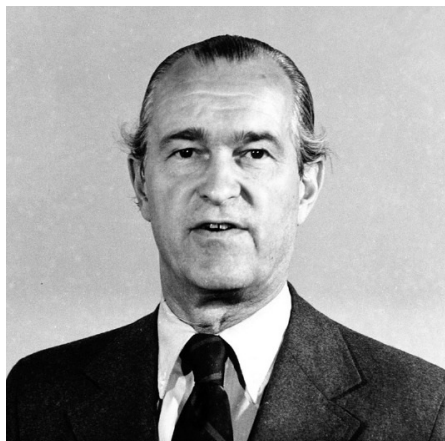
1. Hadden recounted the history of the Israeli nuclear program beginning in 1956 under the leadership of Ernst David Bergmann and Shimon Peres, including the 1957 resignation of the other members of the Israeli AEC due to Bergmann's policy on nuclear weapons.
2. He mentioned an overt "California Group" under the direction of the Israeli Scientific Attaché, Avraham Hermoni.
3. He mentioned one person from the AEC, James Ramey, a lawyer, who worked for the AEC and the Joint Committee and later served as an AEC commissioner. Hadden's notes contained no details about Ramey. Separately it is known that when Seaborg failed to convince the Nixon administration to approve an upgraded security clearance for Shapiro, Ramey secured a job for Shapiro at Westinghouse that did not require a clearance.
4. Basic training of Israeli nuclear scientists occurred at Brookhaven National Laboratory in the U.S. and other facilities abroad.
5. French President Charles de Gaulle was fully aware of the nuclear weapons production mission of the Dimona reactor.
6. French industrialist Marcel Dassault aided the Israelis in developing the Jericho missile for delivering nuclear weapons.
7. The Israelis diversified their approach to nuclear weapons to include both a plutonium-fueled weapon supplied by Dimona, with the aid of the French, and a weapon using HEU stolen from the United States.
8. Shapiro was recruited and NUMEC was established to provide the alternative path to weapons grade material [HEU] for the Israeli weapons program.
9. Just as the Israelis used the Sonneborn Institute in the 1940s and 1950s to coordinate military aid from America to the fledgling nation of Israel, so they coordinated in the 1960s a network of sources in the U.S. to aid Israel's nuclear weapons project.

10. The material stolen from Apollo was taken in small lots over a period of years.
11. An Israeli physicist working at NUMEC engineered the losses of HEU.
12. The essential features of the MUF [ID] experience at Apollo centered on who paid to set up NUMEC and who paid for the HEU that went missing.
13. Shapiro grew nervous in 1971 and left NUMEC when investigators grew closer.
14. Shapiro's "reinsurance agent" inside AEC and his wife were members of the communist party in their youth and were recruited by Soviet intelligence. [It is not clear what Hadden intended by this analogy to the insurance business wherein insurers pass some of their risk along to reinsurers.]
15. Key technicians (including one named Raymond Fox from Livermore National Laboratory) were recruited in the U.S. and sent to Israel to work on select aspects of the bomb and missile programs.⁴⁰
16. Israel began to develop a gas-centrifuge, uranium enrichment facility, had an accident that ruptured cylinders, and sent some urine samples from exposed workers to the U.S. for evaluation. AEC discovered the enrichment project and covered it up.
17. The Plumbat affair.
18. Israel established Institute Number IV near Haifa as the center for nuclear weapons development. In 1965, Yosef Tulipman, the general manager of Dimona, secretly transferred to Institute No. IV. Minister of Defense Dayan later presented Tulipman with Israel's highest award for his service to the bomb project.
19. Israel invested \$100 Million each in its atom bomb project and its Jericho missile project.
20. Hadden opined that the U.S. government should "consider using [the NUMEC] case as exercise in preventing proliferation as opposed to obtaining conviction."
21. Hadden wanted to know who quashed the investigation of Raymond Fox and the official reports of the urine samples from Israel associated with the gas centrifuge accident.

Hadden's notes contained no mention of CIA's discovery of HEU near Dimona, although he mentioned the subject briefly in his BBC interview. His notes outline the basis for his conclusion that NUMEC was part of a broader Israeli-American conspiracy to support the Israeli nuclear weapons program.

Richard McGarrah Helms

Richard Helms was born in Philadelphia in 1913. He spent two of his high school years in Europe where he learned French and German. He graduated from Williams College in Massachusetts and took a job as a reporter for *United Press* in London. He covered the Berlin Olympics where he met Adolph Hitler. He later worked in advertising for the *Indianapolis Times* and as a newspaper reporter before joining the Navy after Pearl Harbor. He transferred to the OSS in 1943. He stayed in Germany after the war to interview suspected Nazi war criminals headed for trial at Nuremberg. In 1946, he controlled intelligence and counter-intelligence activities in Germany, Austria and Switzerland.



Richard Helms
CIA Officer
1947-1973
Director of Central Intelligence
1966-1973

Helms joined CIA in 1947. His first assignment was to lead a covert campaign against the communist party during an Italian general election. The CIA promoted him from the Central European Division to chief of the worldwide Foreign Intelligence Staff because of the results he achieved in Italy. In 1953, he became chief of operations, the second in command of CIA's Directorate of Plans headed by Frank Wisner. He became acting director of that directorate in 1956, following Wisner's mental breakdown, and served in that capacity until Allen Dulles named Richard M. Bissell to replace Wisner in 1958. Helms' specialty was tradecraft, i.e., contacting, securing and running agents in other countries. He was not a technical person and relied on others when intelligence gathering began to use sophisticated technology.⁶⁴⁶

President Johnson appointed Helms as DCI in 1966. He held the post until 1973. Throughout his career, Helms' highest priority was CIA's effort to monitor Soviet intentions and activities so that America would not experience a surprise attack

President Reagan awarded Helms the National Security Medal in 1983. He died in 2002 at the age of 89.⁶⁴⁷

In his posthumously published autobiography, Helms defended CIA's handling of Israel's nuclear weapons program.⁶⁴⁸ He also appeared to accept Avner Cohen's description of Israel's policy of nuclear opacity. In concluding his remarks on the subject, He wrote,

For my part, I had no reason to doubt that Israel has a nuclear capability. The notion that any nation less fearsomely armed can push Israel into the sea is, in my view, nonsense... . In fact, the Agency's tracking of Israel's progress in this area was done in an appropriate fashion throughout the relevant time between 1950 and 1970. There is no need to underline the difficulty of establishing what was being done at the installation built at Dimona in the Negev. To use ambassador Chip Bolen's often-quoted all-purpose trope, it was "like trying to catch a fart with a mitten." CIA was criticized for many alleged intelligence failures in my time, but this one never occurred. The top policymakers were kept adequately informed, and reacted positively to the Agency's efforts and coverage. It was no small chore to avoid leaks or mistakes in working on a matter so sensitive in view of the domestic and international politics involved. This is borne out when one notes that no responsible member of the U.S. government ever felt it advisable to divulge facts on any explicit material regarding these matters. In sum, we did the job and were able to avoid the political pitfalls.

Theodore George "Ted" Shackley

Ted Shackley was born in 1927. His mother was from Poland; his father was a salesman from Hartford, Connecticut. After graduating from high school, he served in Army intelligence in post-war Germany. He learned Polish at home and German in the military. After his Army service, he attended the University of Maryland, graduating in 1951 with a major in history. He also participated in Army ROTC. His forty-seven year old father died of acute alcoholism and heart failure that same year. A short time later Shackley was called to active duty during the Korean War and a few months later was tapped for service in CIA because of his prior intelligence service and language abilities.⁶⁴⁹

Shackley rose quickly from novice to infamy during CIA's most tumultuous times. Following a controversial career in several of the world's most dangerous places, his tangential involvement with NUMEC intelligence was essentially an afterthought. According to Evan Thomas, Shackley was, "a coldly efficient intelcrat, a protégé of [legendary CIA agent] Bill Harvey, who liked to be forward leaning."⁶⁵⁰ Shackley called this "looking downstream" on operational problems.⁶⁵¹ CIA "China Hand" and later U.S. Ambassador to Korea, Jim Lilley described Shackley as "ambitious, tough-minded and ruthless."⁶⁵²

Shackley's first CIA assignments were in Germany, where he met Harvey, then Japan and then the Czech desk at CIA headquarters. In 1962, he was picked by Harvey to be Chief of Operations in the Miami station of CIA where Harvey headed task force W reporting to General Edward Lansdale, an active duty Air Force officer. Lansdale ran a program codenamed Mongoose with the objective of killing Fidel Castro.⁶⁵³ In June 1965, President Johnson ordered closure of the Castro-related efforts in Miami. Shackley oversaw decommissioning of what had become the Agency's largest operation. CIA awarded him its Distinguished Intelligence Medal for his efforts.



Ted Shackley
CIA Officer
1953-1979

Shackley followed his assignment in Miami with a brief stint in Berlin (1965-1966), and then he served in Laos (1966 to 1968) and Vietnam (1968 to 1972). While station chief in Vientiane, he oversaw deployment of Hmong tribesmen of the Laotian highlands to resist the Pathet Lao and to harass the North Vietnamese army along the Ho Chi Minh Trail, the supply line that wound through the Laotian jungle from North to South Vietnam. Up to 40,000 Hmong were in the field at a time. The war destroyed the Hmong people, reducing their numbers by 100,000 or more. Shackley's service in Laos earned him additional notoriety among his peers, "his tenure was marked by excessive bloodletting that could have been avoided. He was chasing delusions of a victory that was not possible ... the butcher of Laos."⁶⁵⁴ Shackley's superiors in Washington called his Laos work "an exemplary success story."⁶⁵⁵

Shackley went to Vietnam in December 1968 to help bolster the Saigon regime. Once out of the jungles of Laos, he assumed a more imperial demeanor, riding through Saigon in a chauffeur-driven, armored American car, carrying a loaded .45 in his briefcase, accompanied by a shotgun-toting bodyguard. His female subordinates in the Saigon office dubbed him the Blond Ghost.⁶⁵⁶ While there, he directed the transfer of a program called Phoenix from CIA to the military.⁶⁵⁷ Before Shackley's arrival in Vietnam, CIA set up the Phoenix program to identify and neutralize civilians supporting the Viet Cong. Estimates of the civilians killed under the Phoenix program ran into the tens of thousands.⁶⁵⁸

In 1972, Shackley returned to Washington to run CIA's Western Hemisphere Division where he undertook a cleanup campaign. In 1973, he received a second Distinguished Intelligence Medal for changes he orchestrated in the Western Hemisphere Division. Soon afterwards, when Colby was promoted to replace Schlesinger as DCI, Shackley became head of CIA's East Asia Division.

In 1976, CIA promoted Shackley to associate deputy director for operations, giving him control over CIA's worldwide covert operations.

On March 9, 1977 President Carter named his former Annapolis classmate, four star Admiral Stansfield Turner, as the twelfth DCI. Turner was a CIA outsider, an intelligence novice and a Christian Scientist who shunned whiskey for hot water with lemon. He was shocked by the good-old-boy attitude of the clandestine service that Shackley served as deputy director. In late 1977 and early 1978 Turner reduced the clandestine service by over 800 people, fired Shackley's boss and shunted Shackley off to a lackluster job coordinating the diverse intelligence operations of the U.S. government. This demotion occurred soon after Shackley delivered his NUMEC briefings to various government officials. In mid 1979, after barely escaping prosecution by the Justice Department for his role in the Chilean coverup, with his patience exhausted by Turner's refusal to let him anywhere near covert operations, and after twenty-eight years with CIA, Shackley resigned. At his farewell ceremony, he was awarded his third Distinguished Intelligence Medal.⁶⁵⁹ Some of his colleagues expressed relief at his departure because his name had become synonymous with professional dishonesty.⁶⁶⁰

In an autobiography published after his death in 2002, Shackley made a number of recommendations for future U.S. intelligence priorities. One recommendation had to do with the need to be concerned, "about the proliferation of nuclear, chemical, or biological weapons in the hands of countries whose rivalries and antagonisms may appear to be purely regional." He cited Argentina, Brazil, India, Iran, Iraq, Israel, Pakistan and South Africa. Curiously, he said India was "within a screwdriver's turn of arming itself with a nuclear weapon."⁶⁶¹ Somehow he missed the fact that India, by that time, had been conducting tests of nuclear weapons, off and on, for 28 years.

When writing their 1991 book about covert activities between Israel and the United States, Andrew and Leslie Cockburn asked Shackley about the possibility of a diversion of enriched uranium from NUMEC to Israel. He was "vehement in disparaging colleagues in the Agency [apparently targeting Hadden and Duckett] who tied NUMEC to the Israeli weapons program." The Cockburns also reported that Shackley told Congressional investigators that Hadden in his retirement "was contemplating his navel and getting bored and was therefore spinning stories [about NUMEC]." Shackley dismissed Duckett as an alcoholic and James Angleton as a wacko. He insisted that no diversion from Apollo occurred, a statement in stark contrast to the briefings he gave to various government officials in 1977.

These comments by Shackley also contrast with the Cockburns' rendition of sworn statements of General Starbird. They said Starbird identified Shackley as the source of the information about CIA's discovery of HEU with a Portsmouth signature near Dimona in 1968.⁶⁶² When questioned about this, Shackley told the Cockburns he could not comment "one way or the other." Shackley also contradicted some of his statements to the Cockburns about people who figured in the NUMEC affair. For example, in his autobiography he gave a more balanced view of Angleton, "This is not to say that everything Angleton did was bad. Actually he did a lot of good."⁶⁶³

Although Shackley met with NSC and ERDA staffers and various Congressmen in the summer of 1977 to tell them of CIA's evidence concerning NUMEC, it is unlikely that he knew anything about NUMEC from his early days in CIA when he was preoccupied with Cuba, Laos and Viet Nam. Thus, in his meeting with such officials late in his career,

Assistant Deputy Director for Operations Shackley addressed what others had done or not done about NUMEC before his watch.

After his death in 2002, his family denied the worst of the myths surrounding his life. His daughter laughed when asked if she agreed with labels like “covert bureaucrat” and “coldly deliberate” that people used to describe his career. “That was not the man we knew,” she said. “The real Ted Shackley was a man who cherished his hearth and home, told good jokes over fine wine and collected Oriental rugs.”⁶⁶⁴

These five CIA officers encountered NUMEC in various ways. Four (Duckett, Hadden, Helms and Shackley) went on the record after retirement to say what they knew. Angleton was characteristically silent. In summary, the varied duties and character of these five provide clues to their credibility.

- James Angleton was a senior CIA manager. He was devoured by a life of intrigue. He was a life-long and honored friend of Israel and aided its espionage activities. He could have paved the way for a Mossad operation at Apollo. He fell from grace because of his leadership of illegal operations on U.S. soil.
- Carl Duckett was a senior CIA manager and an ingenious technocrat who advanced the science of American intelligence gathering. He exerted influence in world affairs by taking information gathered by others and forming opinions for the edification of senior U.S. officials. Some of those opinions were recorded in National Intelligence Estimates while others were delivered directly to AEC, NRC, NSC, the president and the cabinet. He received high accolades from his peers for his contributions to the clandestine service. Under duress from Hersh, who had already tainted history’s view of Angleton, Duckett said he could not prove anything for sure, but he did not take back the fact that HEU from Portsmouth was found near Dimona.
- John Hadden was station chief in Israel at a critical time in the NUMEC affair. He was both a gatherer and an interpreter of intelligence information. He respected classified information. He had long and close connections with Mossad on behalf of CIA. He and Duckett shared similar views on the likelihood that Shapiro aided Israel’s nuclear weapons program. He viewed NUMEC as part of a broad international conspiracy by Israeli intelligence and nuclear officials to steal the bomb. He knew what Hermoni was up to.
- Richard Helms was an accomplished covert operator who ascended to and distinguished himself at the highest rank in CIA. He was a bureaucrat and inept in science and technology. He kept official secrets, even if he had to lie to do so. He expressed no personal affinity with Israel. The “drop it” message he passed from President Johnson to Duckett was consistent with Johnson’s other actions relative to Israel’s nuclear weapons program. In the end, when Helms addressed the Israeli nuclear weapons program, he concluded CIA “did the job.”

- Ted Shackley was a coldly efficient commander of covert operations. He was a major player in some of the most notorious CIA adventures of his time. He was alleged to have committed illegal acts, but he escaped accountability, both during and after his CIA career. He was in Southeast Asia in the mid to late 1960s when the NUMEC affair was unfolding. Shackley provided information about CIA's evidence concerning NUMEC, including the discovery of Portsmouth HEU near Dimona, to ERDA, NSC, FBI and Congress. It is speculative to say, but his later maligning of Duckett and Hadden probably was designed to throw people off the track.

³⁹ On August 6, 1979, in a memo for Udall, Henry Myers noted a possible reason that Hersh came down on the side of Shapiro and not Duckett in his 1991 book. That is, Shapiro's lawyers pressed Udall's staff to believe "that Duckett was a disreputable person, who had been fired from his CIA position for indiscretion, and who should not be believed... . That [Shapiro's lawyers] would have us believe that Shapiro is telling the truth and that Duckett is lying, in itself, says something."

⁴⁰ Hersh described this episode in Chapter 7 of *The Sampson Option*. In 1957, the nuclear physicist Raymond Fox left the nuclear weapons design facility at Livermore National Laboratory and immigrated to Israel. Livermore specialized in computer modeling of three-dimensional shock waves for explosive lenses used in implosion-type nuclear weapons and in development of miniaturized nuclear weapons for delivery by missiles.

Chapter 15

Wrap-up (1979-1980)

The FBI's files on Shapiro and NUMEC continued to grow in 1979. The redacted versions show that the Bureau wanted to end the investigation, while the Justice Department kept asking for a few more interviews. On November 13, 1979, when the investigation was nearing its end, an FBI agent interviewed me regarding my role as the leader of the Conran task force. Almost 20 years later, in 1998 when I began my research for this book, I obtained the agent's summary of my interview. I found it among NUMEC-related records that FBI released to Benjamin Loeb in response to his FOIA request in the mid 1980s as part of his research for Seaborg's memoirs.

The interview was conducted in Bethesda and the agent only asked questions about the alleged diversion at Apollo, i.e., he included none of the other topics addressed by the Conran task force. At that time, NRC was in the midst of its response to the March 1979 accident at Three Mile Island, so NUMEC was not my highest priority. Because of incriminating information that had appeared in the press after the work of the task force ended, the agent inquired why the task force had not probed further into whether or not a diversion had occurred, rather than deferring to second-hand accounts of CIA and ERDA briefings of the NRC commissioners. I said the task force was not given a choice in that matter by the commission. I also recommended that the Bureau talk to Michael Ward of the Dingell staff who had information implying that Shapiro had been an unknowing participant in the NUMEC loss. That part of the interview is clearly legible in the highly redacted and declassified version of the agent's summary of the interview. A section of the interview pertaining to foreign intelligence is redacted entirely.

The FBI report containing the record of my interview includes summaries of many other interviews, has many redactions and includes no other mention of Michael Ward. Perhaps the agent was too busy or did not understand the importance of what I suggested. Curiously, the report is dated November 9, 1979, days before several of the reported interviews were conducted, including mine.⁶⁶⁵

Two of the 50 or so interviews contained in the report were dated September 24 and 26, 1979 and are completely redacted, not even naming the interviewees. Perhaps these were people associated with the CIA. Other pages of the report summarize interviews with former NUMEC employees, but apparently not Shapiro. All of them said they had no knowledge of a diversion. Notables that were interviewed, all of whom claimed to know nothing directly about Apollo, included former Attorney General Ramsey Clark; NRC's Executive Director, William Dircks, who succeeded Gossick in that position; NRC Commissioners Joe Hendrie, John Ahearn, Victor Gilinsky and Richard Kennedy; and former AEC General Counsel and NRC Chairman Marcus Rowden. Several NRC employees from the Division of Safeguards were also interviewed, as were managers and employees of ERDA and DOE, including General Giller, General Starbird and Robert Fri.

One interviewee, former AEC employee Earle Hightower, said he thought an intentional diversion might have occurred. Hightower was assistant director for safeguards and security at the AEC when he retired in 1978. He alleged that Seaborg's close friendship with Shapiro meant NUMEC's violations of AEC rules would largely be

ignored. “We submitted report after report and it went nowhere. My immediate superior ... would take it to the general manager and it generally died there because the general manager knew Seaborg would not do anything. It was frustrating.” It is remarkable that FBI could have heard these statements by a person with this background without qualifying its earlier conclusion that there was no indication of collusion in high places in Shapiro’s favor, that is, no coverup.

In his 1979 FBI interview, General Starbird made no mention of his earlier statement (attributed to him by Fialka and the Cockburns) that Ted Shackley of CIA told him of the HEU found near Dimona. However, former Air Force Colonel Robert A. Erickson, Chief of the Physical Security Branch in NRC’s Division of Safeguards, told the FBI that in about 1976 he saw a classified memorandum in General Starbird’s office that related to the NUMEC matter.⁶⁶⁶ He found it interesting and made a copy. Later, he read the story by John Fialka in *The Washington Star* dealing with NUMEC and found it to contain “much of the same information as the memorandum,” so he destroyed his copy.

On January 9, 1978 Erickson had provided a more detailed account of the classified memo he had read and copied in Starbird’s office. He said, “It was just a collection of ‘tidbits’ and it was very raw intelligence data. It did not say anything about people stealing material. Erickson later received a copy of this same document from Ralph G. Page and put it in his safe. The document bothered him because of its raw, unfinished nature and because it was about a person and was in the nature of character assassination. Because of this, he shortly thereafter destroyed the document ... [before] he read an article by John Fialka in *The Washington Star*. What was in the article about the relationships was almost exactly what was contained in the document he destroyed... . [The document] came from Barry Rich [DOE staffer]. [Erickson] recalled that when Rich let him read the document he said something to the effect, ‘This thing is dynamite’ ... the document helped [Erickson] know why the White House was concerned with the preparation of the report on safeguards—the fear of a possibility, rather than knowledge of a certainty, of diversion.”⁶⁶⁷ When the Conran task force interviewed Barry Rich in 1977, he made no mention of this “dynamite” document.

Nearly all of FBI’s interviewees in 1979 were asked who paid the fine levied against NUMEC by AEC for the U-235 that was missing from the Astronuclear contract.⁴¹ One interviewee whose name was redacted said NUMEC borrowed money to pay the fine from either Pitt National Bank or Mellon Bank. As described above, the AEC interviews of NUMEC employees in 1966 disclosed that the penalty was underwritten by NUMEC’s line of credit with Mellon Bank, which is corroborated by the 1965 NUMEC report to shareholders. The FBI agents conducting the interviews in 1979 apparently had not read the file of FBI interviews conducted a decade earlier that contained this information. The FBI did not ask how the borrowed money was repaid. They should have known but may not have known that ARCO assumed all of NUMEC’s debts in its 1967 acquisition of NUMEC. No one mentioned the even larger quantities of U-235 that went missing from Apollo after 1966 and must have resulted in additional fines.

Gossick told his interviewing agent in 1979 that he had not been properly briefed

before his Congressional testimony and should have testified that there was no conclusive evidence of a diversion at Apollo. It would have saved him a lot of grief if he had said this to Udall and Dingell, either publicly or privately.

Former NRC Chairman Rowden said that when he was AEC's Assistant General Counsel for Administration and Litigation he gave legal advice to AEC employees who conducted the original investigation at Apollo in 1965 and 1966. He did not tell the agent that when he was Chairman of NRC and gave the Conran task force its assignment in 1977, he did not disclose his previous connection with the NUMEC matter. Rowden also did not tell the FBI agent or the Conran task force about the extended interactions among FBI, Shapiro, Seaborg and the Nixon administration that Seaborg later recounted in his 1993 memoir. Rowden probably knew these details because of his service in the AEC's General Counsel's Office, including the years when Seaborg was chairman. For example, Rowden did not say that Hoover thought Shapiro was not trustworthy and should have his clearance removed. Rowden did not tell the FBI in this interview about his interactions with the NSC in the run-up to the release of the inventory difference report in 1977.

In late 1977, Rowden told NRC investigators that he became AEC Solicitor in 1966 with responsibilities that took him away from the NUMEC affair.⁶⁶⁸

In April 1979, David Burnham opined on Rowden's role in the 1965-1966 AEC investigation of NUMEC.⁶⁶⁹

After months of inaction, the five men who ran the commission decided on their course: AEC investigators would interview present and former NUMEC employees, commission auditors would examine NUMEC records regarding uranium shipments out of the United States, and the FBI would be asked to investigate the apparent theft ("unlicensed transfer") of uranium... .

For reasons never satisfactorily explained, however, the bold plans were short-circuited. The theft of nuclear materials was clearly under the jurisdiction of the FBI. But after only one week's consideration, Bureau officials told the AEC that the FBI would not investigate the matter.

The possibility that AEC might undermine what happened with its own investigation was likewise undermined when the commission's general counsel, over the protests of his investigators, ordered them not to take any written statements. The [assistant general] counsel at that time, a thirty-eight-year-old career government lawyer named Marcus Rowden, a decade later was named chairman of the Nuclear Regulatory Commission by President Ford.

Was the AEC sabotaging the very investigation it had just ordered? We don't know. We do know, however, that despite the lack of an immediate FBI investigation and a crippled effort by the AEC, the commission did not hesitate to assure Congress that they saw no cause for alarm.

In early November 1979, Lee Gossick resigned from NRC. The press reported that the commission fired Gossick because of a failure to effectively run the NRC emergency management team during the accident at Three Mile Island in March 1979. Gossick said he resigned because of a chronic failure of the commission “to reach consensus of any kind on many matters.”⁶⁷⁰ This was an unfortunate end to an otherwise distinguished career. It could have been avoided if Gossick had just modified his congressional testimony on NUMEC, either before or after the fact.

On November 27, National Security Advisor Zbigniew Brzezinski denied a request from one of the NSC staff that John Deutch of DOE be given access to an August 1977 memorandum Brzezinski wrote to the president regarding NUMEC. The Top Secret memo was based on briefings Jessica Tuchman Mathews received from FBI, ERDA and CIA. The staffer said that Senator John Glenn had been “pressing John Deutch of DOE for his views on this matter.” The staffer said, “he [Deutch] and I believe it is important that he should know the contents of the memorandum in order to avoid stepping into unknown pitfalls in this sensitive matter.” Brzezinski checked “Disapprove” at the bottom of the memo and added a hand written note, “Brief him orally.”⁶⁷¹

The FBI continued its investigation after its November 1979 report. In an interview by the Bureau’s Chicago office on November 14, 1979, an unidentified source recounted Conran’s allegations. He felt that Conran “was basically correct” regarding a coverup of the NUMEC matter. The source also expressed annoyance with the high ranking retired generals who were “the major obstruction regarding disclosure of the diversion coverup.”⁶⁷²

On February 7, 1980, FBI’s Washington Field Office issued a report of the final two interviews requested by Justice, saying, “Since no further investigation remains, this matter is being closed at WFO.”⁶⁷³

On March 7, 1980, the FBI Director alerted the Pittsburgh, Philadelphia and Washington field offices that three employees in NRC’s Regional Office in King of Prussia, Pennsylvania had come forward with new information on NUMEC. The information concerned the availability of shipping containers for the alleged diversion and the identity [redacted] of a person or persons that one of the sources “suspected may have been involved in the alleged diversion.”⁶⁷⁴ During a subsequent March 19 interview by the FBI, an NRC inspector of fuel facilities recalled an interview on March 5 with an individual in Apollo. That individual had called NRC on February 27 alleging health hazards at the Apollo plant where he worked. The plant was then owned and operated by Babcock and Wilcox and was located near the alleged’s former place of residence. He said B&W dismissed him when he took time off work for illness, saying he “abandoned his job.” He said he had been in contact with authorities of Pennsylvania and someone advised him to contact NRC. The alleged’s union was currently undergoing a grievance

proceeding with B&W to get his job back. The NRC inspector believed the alleged “wanted to wait until this grievance was settled before he considered contacting NRC because both the company and the union consider the Nuclear Regulatory Commission as the enemy.”

Towards the end of the interview, the NRC inspector asked the alleged “if there were any security problems at the Babcock and Wilcox Plant [Apollo].” The alleged said “when he read an article in the newspaper concerning losses of nuclear material when Mr. Shapiro was there, he had to laugh.” When the NRC inspector asked why, the alleged related a story that he asked the inspector to keep off the record.

The alleged stated that in 1965 or 1966, soon after starting work for NUMEC, he and another individual who he was not able to identify were walking near the loading dock at the Apollo facility. “He observed some people, who he was unable to identify, loading cans into some equipment ... the cans were of the approximate size and dimension that would contain high enriched uranium, that is, six inches high and three and a half to four inches in diameter... . He noticed that the shipping papers for the equipment indicated that the material was destined for Israel. He stated that there was a guard with a gun who ordered them to leave the area. As a result of this confrontation, he and his associate left the area.” The interviewee went on to identify several people still employed at Apollo who might know more about this occurrence.

That same day, the FBI interviewed James Devlin, chief of the Security and Investigations Section, Safeguards Branch of NRC Region 1 in King of Prussia, Pennsylvania. Devlin said his office did not conduct any investigation regarding the statements of this alleged.⁶⁷⁵

[Devlin] did indicate, however, that in 1965-1966 the Atomic Energy Commission (the NRC’s predecessor) did not impose any safeguard requirements on organizations like NUMEC and NUMEC did not have a security force per se. According to Devlin, NUMEC’s only armed guard was an individual by the name of (redacted) who was also a Deputy Policeman for the local town, which he believed to be Leechburg Township, PA. According to Devlin, the only other security coverage at the NUMEC facility were unarmed, un-uniformed watchmen who patrolled after hours.

The foregoing interviews led FBI to interview an unnamed former B&W employee on March 21. That individual probably was the alleged identified by NRC, but his identity is unclear from the redacted records that FBI released. In any event, a confidential source told FBI (extraneous information has been deleted from this quotation),

In late March or early April 1965 (exact date unknown) while working [at Apollo] on a swing shift from 3:30 p.m. until 12:00 a.m., his ammoniator was shut down between approximately 9:00 and 10:00 p.m. in the evening. He stated that because of negative air pressure within the plant area, conditions were usually very warm so he walked out to the loading dock for a breath of air. The loading dock was located approximately 20 feet from his equipment through a single

door. He advised that employees often went to the loading dock to get a breath of air and further said he thought he remembered an employees' eating area on the dock.

He related that when he entered the loading dock area on this particular evening, he noticed a flatbed truck backed up to the loading dock with some strange equipment on it. He described the equipment as several steel cabinets with some kind of gauges on the front of them and other equipment, which looked like lathes. He opined the equipment may have come from the pelletizer area of which he was not familiar. He advised he then noticed the NUMEC owner, Dr. Zalman Shapiro, pacing around the loading dock while (redacted) (Shipping and Receiving Foreman) and (redacted) (NUMEC truck driver) were loading "stove pipes" into the steel cabinet type equipment that he observed on the truck. He recalled there were four or five of the steel cabinets on the flatbed truck. He stated that (redacted) and (redacted) never loaded trucks themselves, always employing other workers.

He stated that the "stove pipes" are cylindrical storage containers used to store canisters of high enriched materials in the vaults located at the Apollo nuclear facility. He stated that the "stove pipes" contained three or four canisters which were described as highly polished aluminum with standard printed square yellow labels, approximately three inches in diameter by six inches tall, that normally are used to store high enriched uranium products which he defined as 95 percent uranium.

He stated that he observed two workmen, whose names he could not recall, bringing the "stove pipes" from the High Enriched vault area located approximately 150 feet from the docks to the dock area where (redacted) and (redacted) opened the "stove pipes" and withdrew the canisters located in the "stove pipes." He then said (redacted) checked the label on each canister for information and checked it off on a shipping order he had attached to a clipboard. He advised that the canisters were then replaced in the "stove pipe" and then the "stove pipe" itself was loaded into the cabinet type equipment after being wrapped with a brown paper type insulation. He advised that he observed one cabinet being loaded and that the "stove pipes" were placed one in each back corner of the cabinet and one in the front center of the cabinet directly behind the door. [The draft of this FBI document recorded that the source also advised that most shipping at Apollo was done during the day.]

He described the canisters found in the "stove pipes" as approximately three inches by six inches, bright polished aluminum canisters with yellow labels containing typewritten information and nuclear "fan" symbols in the upper corners of the label. He said he never observed typewritten information on the labels that he had previously seen on the dock.

He advised he was sure this was High Enriched uranium products due to the size and shape of the container and the labeling. He stated that the containers he used in the Low Enriched area were much larger than the canisters he observed and used a different label.

He stated he had never seen “stove pipes” used as shipping containers but whenever High Enriched uranium products were shipped, the canisters were unloaded from the “stove pipes” and loaded into cement lined steel drums. He further advised that the route the workmen transporting the “stove pipes” used took them away from the Low Enriched area and brought them onto the dock through a different door. The Low Enriched materials vaults were located approximately 50 feet from the dock area down an angled corridor. He said the normal route for High Enriched materials from the High Enriched vaults was down the same corridor where the Low Enriched vaults were located.

(Redacted), citing his natural curiosity, stated he observed (redacted) lay his clipboard down on the empty drum located on the dock, whereupon he proceeded to read the information contained on the shipping order. He said he noticed that the destination for the equipment on the truck was Israel, and that it was to be transported by ship. He recalled that the ship had a long foreign name, which he believed to be Greek, and its location at the time was in New York City.

He stated that after he had quickly read the information contained on the shipping order, (redacted) grabbed the clipboard away from him, telling him in words to the effect that the material contained in the shipping order was confidential and not for his eyes. He advised that shortly thereafter, an armed guard ordered him off the loading dock. He stated that he did not observe anybody call the armed guard nor did he see the guard on the dock, but that he believed the guard came from one of the hallways adjoining the dock. He stated that he was on the loading dock for approximately 15 minutes and that at no time did Dr. Shapiro (redacted) or (redacted) or anybody else ask him to leave.

He further advised that it was highly unusual to see Dr. Shapiro in the manufacturing section of the Apollo nuclear facility; it was unusual to see Dr. Shapiro there at night; and very unusual to see Dr. Shapiro so nervous as to pace around. He described Dr. Shapiro as a very calm, cool and collected man who never got upset.

He advised he had not come forward before because he had a large family to support and the day following the incident, the plant Personnel Manager (name unrecalled) of NUMEC threatened to fire him if he “did not keep his mouth shut” concerning what he had seen on the loading dock the night before. He further advised he mentioned the threat he received from the Personnel Manager to his union steward, whereupon he claims he was visited by “some union goons” from Kittanning, Pa., and again told to keep his mouth shut.

He stated the prevailing attitude at the plant in 1965 by management, union and employees was that the Atomic Energy Commission was the enemy looking for a reason to shut the facility down with the resultant job losses. In addition he stated he did not know how or who to contact in authority who would take action.

A second version of this interview in the FBI files has somewhat different redactions and appears to be a Teletype draft of the document quoted above.⁶⁷⁶

In March, word of the continuing investigation got back to Shapiro, and he had a Washington lawyer named Harold Ungar (an associate of Edward Bennett Williams) speak to the *New York Times*. Ungar said that his client's position, "is very simple: he never diverted a single microgram of nuclear material to Israel or anyone else and does not believe that any one else did so at the plant."⁶⁷⁷

It appears that FBI was receiving new information from a new source about some suspicious shipping activities that occurred in early 1965, just before the Oak Ridge audit in April, which found that 93.8 kilograms of U-235 was unaccounted for. The new source was not entirely consistent in telling his story. For example, he told the NRC inspector that another employee accompanied him to the dock for a breath of air. That fellow employee is missing from his later interview with the FBI agent. The part about an armed guard telling employees to leave the loading dock on the night in question was not disclosed by earlier AEC or FBI investigations. Its relevance is that AEC did not require nor did NUMEC normally provide armed guards for shipments in the 1960s. Gerry Page, Deputy Director of NRC's Division of Safeguards, confirmed that AEC regulations did not require armed guards at sites like Apollo until the 1970s.⁶⁷⁸

Another FBI document from this period summarized interviews with two B&W employees (names redacted) at Apollo who previously worked for NUMEC. One of the employees had been a long time Transportation Supervisor and the other was a truck driver. They recounted details about the cans in which HEU was contained, the color of the coveralls worn by NUMEC workers (blue ones to indicate clean (not radioactive) and white ones to indicate hot (radioactive) areas of the plant) and the location of the storage vault for HEU relative to the loading dock. The transportation supervisor described the procedures for loading radioactive shipments onto trucks at the Apollo loading dock. Some of his detailed information confirmed what the ammoniator operator had told the FBI about the alleged shipment to Israel in 1965, while some of his details contradicted what the ammoniator operator said.

The transportation supervisor said that the Apollo shipping department always trusted the vault handlers to have loaded the proper materials into the shipping containers and did not open the containers on the dock since it could have been dangerous to do so. The transportation supervisor listed four shipments to Israel in which he participated. All were large containers, all occurred between 1962 and September 1966, three via the port of New York and one via Newark. Two Israeli shipping companies were involved, Maheir

Steamship Lines and Zim-Israel Steamship Lines.⁴² The supervisor said the only thing unusual about these shipments was that three of them were loaded directly from the NUMEC trucks onto the ships rather than being first placed in warehouse storage, and one of the shipments was met and handed over to a representative of the Israeli Defense Ministry. The Transportation Supervisor “advised that Dr. Shapiro made frequent visits at odd hours to the manufacturing area of the NUMEC, Apollo facility, but rarely said more than hello to the employees. He advised that Shapiro would often see something wrong and would tell the employee to correct it or contact the employee’s supervisor to see that a correction was made. He described Dr. Shapiro as a very calm man. He advised that he was aware and it was common knowledge throughout the Apollo, Pa., Facility that Dr. Shapiro made several trips to Israel during the 1962-1966 time frame.” The FBI Director followed up on these interviews by tasking various FBI field offices to conduct further interviews to ascertain information about shipping procedures at NUMEC in the 1960s.⁶⁷⁹

A May 7, 1980 interview with a confidential source found, “The alleged shipment consisted of two crates, one measuring approximately eight feet by ten feet by eight feet, the other approximately four feet by five feet by four feet. The crates were marked with radioactive form symbols... . SF [San Francisco office of FBI] should conduct an interview of (deleted). If appropriate, the interviewee should be furnished his rights during interview.”⁶⁸⁰

The San Francisco office of the FBI reported a May 9, 1980 interview with a confidential source about shipping practices at NUMEC in the 1960s. The source described containers used for Cobalt 60 food irradiators, i.e., cylindrical lead casks five feet by three feet that were encased in wooden boxes five by five by seven feet. The source went on to say,⁶⁸¹

(Redacted) was a deviation from usual shipping procedures in this instance in that the containers were packed and sealed late at night. (Redacted) was not present at night to witness the packing procedures. (Redacted) there was excess space in the lead casks after the Cobalt 60 was packed and other materials could be placed into the casks in addition to the Cobalt 60 if someone desired to ship them in this manner... . On this particular occasion he placed a package of cigarettes and nylons in one cask (redacted). He did this as a friendly gesture and subsequently received a note of appreciation from those receiving the package. He placed the items in the shipping casks before they were turned over (redacted) for packaging. (Redacted sentence.)

On June 11, 1980, the director of NRC’s Office of Inspector and Auditor wrote to the chief of the Internal Security Section in the Justice Department’s Criminal Division.⁶⁸² He asked Justice to supply “copies of all existing and future FBI reports arising from FBI’s ongoing investigation of the allegations by Ronald E. Biesecker concerning NUMEC’s Apollo, Pennsylvania facility. As you are aware, an NRC inspector initially received these allegations and this office referred them to the FBI in March 1980. Since that time we have not been provided with any additional information developed by the FBI.” The letter went on to explain why NRC needed information from the FBI. In its response to various FOIA requests, the FBI has released no records showing that it ever

honored the request from the NRC inspector and auditor for NRC to be informed of future reports arising from the FBI investigation of Biesecker's allegations.

On December 16, the special agent in charge of FBI's Washington Field Office reported the results of an interview that was conducted 13 days earlier of another unidentified source. The report is highly redacted except for a portion that reads, "Although he cannot recall any specific shipment, he advised that there were about 12 shipments a year from that facility. All were 'emergency' shipments in the sense that they were usually late in departing and that trucks were standing by which were expensive to hire. Thusly, some shipments were loaded at night as soon as they were prepared." The source went on to say he knew no diversion occurred because the uranium was lost in its processing.⁶⁸³ The estimate of 12 shipments per year must have applied to shipments of a special kind, e.g., food irradiators, because there were probably at least that many other shipments per month to domestic customers. In retrospect, a facility that shipped hazardous materials on a continuous basis surely would have developed practices that did not routinely require handling at night.

On January 15, 1981, an agent from the FBI office in Columbia, SC interviewed a confidential source. The report of the interview is highly redacted. The interview report ends with, "He stated that he had no personal knowledge of what was actually contained in this cask, as he did not see the cask being packaged or have access to its actual contents. He said that the only thing that he could say regarding the contents is that the radiation emitted from the cask was consistent with what would be emitted by Cobalt 60."⁶⁸⁴ A cask designed for transportation of a Cobalt 60 source would have been well shielded so that the gamma rays it emitted would not harm people who handled the cask. It was not feasible then or now, except in a laboratory environment, to detect radiation that would have been emitted by HEU hidden within the cask along with the cobalt. Furthermore, the addition of HEU to the lead lined cask, if controlled thoughtfully, would not have added significantly to the weight of the cask.

The last document in the FBI records on NUMEC is dated April 22, 1976 and has appendices that extend into the early 1980s. It is six pages long and summarizes the investigative efforts by the Bureau up to that time. It is highly redacted at page three where the only remaining information relates to David Lowenthal and Zalman Shapiro and their relationships with Israel. Pages five and six of the report were added after April 1976 and update it to reflect the investigation ordered by President Ford. The added pages reflect the Bureau's conclusion that "To date, there has been no substantive evidence to indicate that a diversion occurred, nor has there been evidence to prove the allegation that Government officials sought to overlook violations of security and accounting procedures that occurred at the NUMEC facility." The reader will note that this second conclusion was not relevant to the question that Attorney General Levi asked FBI to address, i.e., had an agency or official covered up evidence of a diversion. The document also lists the various Congressional offices that were briefed on the Bureau's investigation.⁶⁸⁵ There is an additional set of twenty-eight documents labeled "See" References. Most of their pages are redacted. They bear dates from 1949 to 1979, but most are in the 1968 to 1969 period. There are 794 documents in the FBI file bearing the identifying number FOIA 117-2564.

Handwritten notations on FBI's documents reflect an interaction, beginning in June 1982, among the Bureau, the Justice Department and Congress to determine the conditions under which FBI files could be made available to members of Congress. The annotations on the documents show that someone went through the Bureau's files to assure the correct classification on key documents. The annotations show many downward reclassifications beginning in the early 1980s. The criteria that the Bureau said it applied to the redaction process before granting access to the files were twofold, namely, protection of the privacy of individuals and nondisclosure of investigative techniques.

⁴¹ As described earlier in this account, the amount of the fine related to the Astronuclear contract was \$764,000 out of about \$2.2 million in fines paid by NUMEC for missing uranium up to and including the Astronuclear contract.

⁴² Zim was Israel's national shipping company. Doron and Gelman identified it as the same line used by Mossad and LAKAM in other ventures. One was the Cherbourg affair of 1969 in which Israel purloined five missile boats from France, bypassing the weapons embargo that followed the Six-Day War. Another was the 1968 Plumbat affair in which Israel took 200 tons of uranium yellowcake from a ship bound from Antwerp to Genoa and diverted the material to Israel.

Part Five: Whodunit
Chapter 16
Shapiro's Recollections

Zalman Shapiro engaged in wide-ranging interviews in 1984 and 1994 for the Pittsburgh Section of the National Council of Jewish Women. The interviews are available on line.⁶⁸⁶ In the first interview, he described his service as vice president of the Zionist Organization of America, officer of Technion Society, director for Hillel, volunteer for the Jewish Federation, volunteer for the Anti-Defamation League, and affiliation with Young People's Synagogue. He reminisced about Rickover, Bettis and the formation of NUMEC. He said that Rickover was a great man, but was petty and vindictive and held a grudge. He said that when he left Bettis in 1957 to form NUMEC he wrote to Rickover and "he black listed me, told people at Bettis and Knolls Atomic Power Laboratory not to deal with me... . Lots of people had problems with [Rickover]. In spite of him, we were able to succeed. Eventually, his lieutenants in Bettis had problems and came to me for help." Shapiro said he formed a close relationship with Congressman Chet Holifield (D-CA), former chairman of the Joint Committee. He also opined on Israel's financial problems and defense capabilities early in his career. When asked in 1984 whether Israel had nuclear capabilities, he said,

I don't know that Israel has anything the Arabs don't have. Israel has a lot of scientific and technological skill. I suspect, given the resources, they could do whatever we've done here. Israel certainly doesn't have the kind of money it requires to build the kind of massive capability that we are building... . [This] is all speculation. Speculation is what I am doing as well... . Israel would like the Arabs to think they have the capability. It's probably acted as a deterrent to a degree. But even if they had a bomb what could they do with it? ... It's a futile game, this whole thing... .

In both the 1984 and 1994 interviews, Shapiro described his work to create Americans for Energy Independence between 1973 and 1975. He said the organization's goal was to sensitize Americans to the role of Arabs in controlling energy supply and to create a better attitude toward Israel. He commented on his efforts to promote alternative forms of energy, conservation of energy and atomic energy. He also discussed NUMEC's purpose of making uranium fuel.

He named other companies involved in the nuclear business. He said he started NUMEC with a Westinghouse colleague in 1957 and grew it to 1000 employees in 10 years. He described negative publicity about NUMEC's burial of nuclear waste on private property in Pennsylvania and noted that all waste material was buried according to the rules of AEC. He described employees' complaints about illnesses caused by working with radioactivity. He recounted that NUMEC supplied fuel to one half of the world's nuclear reactors, including some in Japan, Italy, France and Sweden, and developed the first nuclear-powered pacemaker and the first plutonium laboratory in the world. He explained that the work was very difficult and confining. He worked seven-day weeks and created a large number of patents. He noted that he was trying to bring technology

developed in the U.S. to Israel. He said Shimon Peres was a liar who could not be trusted and was only interested in winning the Nobel Peace Prize.

He did not mention his connections with officials of Israeli defense, atomic energy and intelligence agencies. He did not mention nuclear batteries or food irradiation. Nor did he describe his joint business ventures in Israel. He also did not bring up the FBI, CIA and Congressional investigations of his activities.



Dr. Zalman M. Shapiro
NUMEC President
1957-1970

On April 13, 1993, Shapiro wrote a two-page thank you letter to Glenn Seaborg.⁶⁸⁷ He thanked the former AEC chairman for sending a copy of his “revealing new book with your personal inscription... .

Needless to say, my immediate focus was on the NUMEC chapter. I cannot thank you enough for your determination and perseverance in upholding your principles and the rules of fairness established by the AEC, in spite of the pressures to which you were subjected by Attorney General Mitchell and his henchmen. It is interesting to note, in passing, that apparently those who are themselves dishonest have the attitude that everyone else is, as well. Your chapter on the NUMEC affair brought back many painful memories. Not only were my career and health adversely affected and my family traumatized, but it cost me a fortune in lawyers’ fees to defend myself against charges which had no basis in fact.

Shapiro went on to recount for Seaborg the “snide remarks made by my peers and superiors” and his significant contribution to the security of America while working at Bettis, “as Admiral Rickover reluctantly admitted.” He said he was not aware of some of the difficulties Seaborg experienced “because of interest in the matter at the Cabinet and Presidential levels.”

Shapiro said that new information about recovery of uranium during decommissioning of Apollo led to an “overage” of SNM that

Obviously explained a significant portion of the losses reported and

paid for by NUMEC... . These finds prove, beyond a shadow of a doubt, that there was no diversion, only process losses. What really hurts is the fact that the NRC has not seen fit to make this public and clear my name. They were quick to accuse, but obviously loath to admit error. Your book has made [sic] a significant contribution to the history of atomic energy. I am especially grateful for your treatment of the NUMEC affair.

In August 2002, the *Valley News Dispatch*, a newspaper published in the Pittsburgh area, ran a four-day series of articles on NUMEC. Henry Myers apparently was the primary source for the paper's description of the various investigations. Shapiro declined to discuss the allegations of a diversion, opting instead to list numerous accomplishments by NUMEC in the nuclear field. He cited much the same list that he provided to the National Council of Jewish Women in 1994.⁶⁸⁸

Finally, in deciding whether or not Shapiro committed the acts alleged, it is worth considering the fact that he has not followed the same path as Arnon Milchan, i.e., taking credit for services rendered to Israel's nuclear weapons program. There are differences between the two cases, of course: Milchan is an Israeli citizen and Shapiro is not. Nevertheless, it is important to recognize that Shapiro has been steadfast in maintaining his innocence. He will celebrate his 96th birthday in 2016, which is a long time to maintain one's innocence and deserves some credit.

Chapter 17

Alternative Hypotheses

Shapiro, Hersh and Seaborg advanced two hypotheses to explain the missing U-235. First, they opined that the material was hidden as contamination in the cracks, crevices, pipes and equipment of the Apollo uranium plant and was recovered during the decommissioning of the plant. The other hypothesis supported the first, namely, it was not feasible for anyone to steal a significant quantity of HEU from the plant because there were too many people around and the material was too closely guarded. This chapter addresses those two hypotheses.

Beginning in 1978, Babcock and Wilcox Company, the third owner of the Apollo uranium plant, decontaminated and disposed of it. The industrial facility adjacent to the uranium plant continued to operate as a steel fabricator until its owners demolished the building in 1992. The NRC and Pennsylvania regulators co-operated in overseeing the decontamination, demolition and disposal operations. By 1995 the buildings were gone, the entire site had been returned to green-field status and all radioactive material had been shipped to licensed disposal sites outside of the state. B&W decontaminated and disposed of the Parks Township site a few years later.

The first step in decommissioning the Apollo site was removal of all equipment inside the building. The equipment was surveyed for radioactive contamination before disposal, and any significant amounts of uranium that were found were returned to the inventory of the plant. When only the outside structure of the plant remained, it was enclosed in a tent-like structure that moved along railroad tracks as demolition proceeded. The tent kept any dust from escaping when the steel superstructure and the bricks, blocks, and concrete were pulverized for shipment to radioactive waste disposal sites. Then the concrete foundation and underground piping were disposed in a manner that returned all significant quantities of uranium to the cumulative inventory of the plant. Finally, B&W monitored contaminated soil beneath the buildings and disposed as radioactive waste any soil that exceeded natural background radiation levels. In following this stepwise process, B&W returned significant quantities of uranium to inventory. Clean soil was brought to the site and used to restore natural grade in the area; then B&W reseeded the site. B&W installed groundwater monitors to assure that the site maintained long-term compliance with drinking water standards of the Environmental Protection Agency.

One of the last documents in the FBI files on NUMEC is a May 19, 1982 letter from NRC to FBI transmitting a summation of the uranium found during decommissioning of Apollo. It notes that NRC provided the same information to reporter Thomas O'Toole of the *Washington Post*. The attachment says that processing of highly enriched uranium by NUMEC at Apollo began in 1957 and ceased in 1978. It notes that decommissioning began in 1978 and had no fixed date for its completion. The attachment says the cumulative inventory difference for the operating period from 1957 to 1978 was 463 kilograms of U-235. It concludes,

The total amount of material accounted for [recovered] to date as a

result of the decommissioning effort is 95 kilograms U-235... . Additionally, licensee measurements indicate that approximately 31 kilograms of U-235 are held up in the walls and floors. The resulting total cumulative ID for the period from 1957 to present is 368 kilograms U-235.

That is, NRC told FBI to expect that 337 kilograms (368 minus 31) of U-235 would remain missing from the uranium plant at Apollo when B&W completed the decommissioning.⁶⁸⁹

The estimate that the NRC provided to the FBI was in close agreement with the aforementioned 2001 DOE report (declassified in 2006), which tabulated the cumulative inventory difference at U.S. commercial sites that handled HEU from 1952 to 1996. The DOE reported the cumulative HEU inventory difference at Apollo as 269 kilograms of U-235 through 1968 and 76 kilograms thereafter, for a total cumulative inventory difference over the life of the plant of 345 kilograms, in close agreement with NRC's 1982 estimate of 337 kilograms.⁶⁹⁰ The following table summarizes inventory differences from the beginning of operations to the end of decommissioning of the Apollo uranium plant.

Seaborg and Hersh argued in their separately published books in 1991 that uranium found during decommissioning of Apollo would make up for the amount alleged to have been diverted to Israel.⁶⁹¹ They apparently did not know of NRC, B&W and DOE's conclusions to the contrary. That is, the fact that about 100 kilograms of U-235 in the form of HEU was found during decommissioning of Apollo does not eliminate the possibility that the 93.8 kilograms that the AEC could not account for in its 1965 inventory, or the larger amount that went missing between 1966 and 1968, were stolen. Said more simply, even after taking into account the recoveries made during decommissioning, approximately 340 kilograms of U-235 in the form of HEU were still missing after the plant had been turned into a green field. Much of this amount went missing before late 1970 while Shapiro led NUMEC and before the higher throughputs occurred at Apollo in later years.

Date	Source	Total ID, kg	Reference
Sep 1959	AEC (Lovett) estimate	2	Paper from DOE Archives
Sep 1961	AEC (Lovett) estimate	14	Paper from DOE Archives
Sep 1963	AEC (Lovett) estimate	103	Paper from DOE Archives
Sep 1965	AEC (Lovett) estimate	167	Paper from DOE Archives
Oct 1965	AEC Audit	178	McDowell Report, 4/66
Dec 1966	GAO Audit JCAE	260	GAO Report, June 1967
May 1968	NUMEC records	287	Lovett prep for Crowson
Dec 1968	HEU: Striking a Balance	269	DOE Report, Jan 2001
Mar 1974	Data reported to AEC	363	NUREG-0350, Aug 1977
Feb 1977	Routine Inventory Report	452	B&W to NRC, Mar 1977
May 1982	NRC estimate of final ID	337	NRC to FBI, May 1982
1996	HEU: Striking a Balance	345	DOE Report, Jan 2001

As to the second hypothesis, several NUMEC employees told AEC interviewers in 1966 that it was impossible to steal uranium from Apollo without someone seeing it happen and either preventing it or reporting it. Seaborg agreed,⁶⁹²

If you thought Shapiro could slip into the plant at night and fill a suitcase with uranium, you could give some credence to the smuggling charges. But that was preposterous. He would have needed the cooperation of quite a few of his employees (if not the whole workforce) to divert enriched uranium to Israel, and such a conspiracy would certainly leave some tracks.

Counter to Seaborg's intimation, there were many tracks. They included records of HEU gone missing over a series of contracts, recollections of an employee ordered off the loading dock at Apollo one night in 1965 by an armed guard that didn't belong there, subsequent intimidation of that employee, HEU with a Portsmouth signature found near Dimona, trips to Israel at auspicious times, and suspicious meetings with Israeli spies.

The Congressional investigations in 1977 and 1978 cut away many of the veils that had hidden the NUMEC affair. By then it was obvious that LAKAM, with or without Shapiro's help, could have stolen HEU and shipped it to Israel without detection. The Israeli's *modus operandi* was to involve any local assistants as little as possible in their clandestine operations, as they did in the Eichmann and Plumbat cases. They probably would have gone to similar lengths to protect Shapiro.

As early as 1966 the AEC concluded the material could have been diverted even if it could not find proof. NRC Chairman Hendrie reached the same conclusion in late 1977, i.e., someone could have done it so NRC should protect against that eventuality in the future. However, just to make sure, in 1979 Congressman Udall asked NRC for a study of whether it was feasible for a diversion to have occurred. Udall asked NRC to "provide a brief description of requirements, put into effect since 1965, that corrected deficiencies in the ability to protect against diversion of strategic special nuclear material by sophisticated conspirators."

The NRC staff divided Udall's task into two parts. First the NRC analysts characterized AEC's safeguards requirements in place at Apollo in 1964 and then they listed the deficiencies in those safeguards requirements compared to NRC's requirements in 1979. The primary purpose of the study was to ensure that safeguards requirements in place by 1979 would prevent such a diversion, but a secondary purpose was to shed light on the question of whether it would have been possible to divert a significant quantity of HEU from Apollo in the early 1960s without being detected. The NRC's top vulnerability analyst, John Hockert, led the analysis team. The team reviewed several thousand documents pertaining to the places and times of interest, including all of DOE's documents pertaining to NUMEC, culled nearly one thousand documents as potentially relevant and relied on 130 of them in its final report.

The NRC team looked at three levels of safeguards, namely, those that met AEC's standards in the mid-1960s, those in place at the uranium plant in the mid-1960s, and those that met NRC's standards in 1979. NRC concluded,⁶⁹³

It is possible that significant quantities of high enriched uranium could have been removed from the NUMEC Apollo facility during the mid-1960s, by a knowledgeable insider or an outside group with assistance of an insider, without detection. It is of course possible that no such

removal occurred. Our review did not develop any information to indicate that a theft did or did not occur, only that the system would not have been able to detect a theft.”

William Dircks, when he was serving as director of NRC’s Office of Nuclear Materials Safety and Safeguards, described the NRC staff report to Congressman Udall. He said Hockert’s analysis shows that, “a knowledgeable insider could quite easily have obtained the material in that plant ... [and it] would have been very, very difficult to detect... . There is circumstantial evidence that points one way, but nothing concrete enough that we could go out and indict somebody.”⁶⁹⁴

This conclusion by NRC safeguards experts differs sharply with the conclusion that Seaborg reached in his 2001 memoir.⁶⁹⁵ Remarkably, in his 1993 memoir, Seaborg referenced this same NRC study for, “much of the detailed information herein about the materials losses at NUMEC and the AEC’s materials safeguards system.”⁶⁹⁶

Chapter 18

Apollo Sunset

This chapter summarizes what people and organizations have concluded about the NUMEC affair. It is somewhat but not completely repetitive of conclusory statements in preceding chapters.

To paraphrase Peter Wright, in the penultimate page of his autobiography *Spycatcher*: One person might have faith in a man's innocence while another has faith in his treachery, as another might have faith in God or Mammon. One person's view, in the end, is worthless. Only facts will ever clear up the eternal mystery.

J. Edgar Hoover in 1969 said the FBI “developed information clearly pointing to Shapiro’s pronounced pro-Israeli sympathies... . It is believed most unlikely that further investigation will develop any stronger facts in connection with the subject’s association with Israeli officials. The basis of the security risk posed by the subject lies in his continuing access to sensitive information and material and it is believed the only effective way to counter this risk would be to preclude Shapiro from such access, specifically by terminating his classified contracts and lifting his security clearances.”⁶⁹⁷ Seaborg said Hoover made it clear that the suspected offenses included not only diversion of material but also divulging of classified information to representatives of Israel.⁶⁹⁸

However, AEC Director of Security William Riley wrote to J. Edgar Hoover.⁶⁹⁹

The investigation, however, did not produce evidence which would provide AEC a sufficient basis either to revoke Dr. Shapiro’s security clearances under our established personnel clearance procedures or to bar him from further classified contract activity... . In this regard, the Attorney General, in his letter to the Chairman, AEC, on April 4, 1969, advised that the Department has no evidence which would support any action by the Department.

In 1971, when Shapiro applied for a Sigma security clearance after leaving NUMEC, Attorney General Mitchell said the charges against Shapiro “were serious enough so that the man should not have access to sensitive weapons information and he thought the case should be settled by the courts.”⁷⁰⁰

In 1982, the Department of Justice decided, for the last time, not to prosecute Zalman Shapiro. This decision surely was made because there was insufficient or inadmissible evidence to do so. Collaterally, the Justice Department decided not to prosecute anyone in government for covering up the NUMEC affair. There is proof that Justice considered this possibility, not just at the AEC and its successors but also at the CIA. On March 22, 1979, an article by David Burnham in the *New York Times* referred to the fact that FBI and CIA had refused to allow GAO access to their classified files pertinent to the NUMEC investigation. Reacting to that article, Frederick D. Baron⁴³ wrote to Attorney General Griffin Bell, with a copy to Jack Davitt, long time head of the

internal security section,

The Internal Security Section has now completed a detailed review of thousands of CIA documents [about NUMEC] and is preparing a report. On the basis of this document review, some further investigation by the FBI will be necessary... . Jack Keeney⁴⁴ believes that upon completion of the review, we should give serious consideration to making the materials available to an appropriate committee of Congress.

The attorney general scribbled “Noted GBB 4/23/79” on his copy of the memo.⁷⁰¹ The materials to which the memo referred have not been made available outside the CIA and the Justice Department. A November 14, 1980 memorandum from Henry Myers to Congressman Udall contains another reference to the Justice Department review of the CIA documents.⁷⁰² Myers noted,

The Department of Justice (apart from the FBI and apparently for the first time) has undertaken a comprehensive review of CIA documents. Three lawyers from the Criminal Division spent months examining documents, and a report on their findings exists, but they are resisting showing it to us.

The FBI knew about the Justice review of CIA documentation for several years. In December 1978, FBI’s legal counsel wrote to the FBI director, “Mr. [John L.] Martin advised that he is leading a three-man Task Force organized by the Criminal Division pertaining to allegations of coverups by Governmental agencies in the NUMEC case.”⁷⁰³

An important conclusion can be drawn from the fact that no indictments resulted from this Department of Justice investigation. Attorney General Levi initiated it to determine if any governmental agency had covered up the NUMEC affair. Since the investigation was broad, including the CIA, it is likely that Justice found no prosecutable wrongdoing on the part of the agencies involved, that is, FBI, AEC, ERDA, NRC, DOE and CIA. The Justice Department’s declassification and release of the prosecution memorandum that it prepared for the attorney general could confirm this conjecture. Investigative journalists Howard Kohn and Barbara Newman said Levi “personally decided not to seek indictments in the case because he felt the evidence was not admissible in court.” They said Robert Barrett, an aide to President Ford, confirmed this account.⁷⁰⁴ Neither Justice nor FBI have admitted the existence of a prosecution memorandum prepared for either Attorney General Levi or Attorney General Bell, let alone released it.

The AEC and its successor organizations (ERDA, DOE and NRC) never changed their interpretation of the facts surrounding NUMEC. That is, the U.S. government’s atomic energy establishment has maintained to this day that it is impossible to tell if the 93.8 kilograms or more of U-235 in the form of HEU lost from Apollo was stolen or not. If AEC had been more candid in 1965, it would have said that a full accounting of all the uranium at Apollo and all the known loss mechanisms, including poor accounting

practices and careless operations, failed to find the missing 93.8 kilograms of U-235 and left one possibility—it had been stolen. Had AEC been candid, later published reports could have been equally candid. However, AEC would have failed to fulfill one of its important mandates at the time, namely, to promote nuclear power. Thus, in 1992, twenty-seven years after AEC told the Joint Committee about its Apollo investigation, NRC's historian J. Samuel Walker summarized the facts as he knew them. That is, the 93.8-kilogram MUF [unexplained portion of the 178 kilogram inventory difference] at Apollo for the years 1957 to 1965 was caused by “poor accounting practices and careless operating procedures on the part of NUMEC ... but [AEC] could not dismiss the possibility that the missing material, which was enough to make six atomic bombs, had been diverted to a foreign nation.”⁷⁰⁵

As for the future, NRC Chairman Hendrie said it best in 1977, soon after becoming NRC chairman. He told congress that people within NRC had legitimate differences among them on the meaning of the term “no evidence” of a diversion from Apollo. He said “no conclusive evidence” was a better way of describing the situation, and “for regulatory purposes we must assume the circumstances were such that a diversion could have occurred, and must construct our safeguards requirements accordingly.”⁷⁰⁶

In January 1979, John Fialka, writing for the *Washington Monthly*, summarized the knowledge about the missing uranium. “After factoring in reasonable estimates for all possible ways in which material could have been lost or wasted in various plant processes, the [AEC] inspection team concluded that the loss of 200 pounds could not be explained, including the missing uranium from the Westinghouse contract. No similar plant had ever reported losses of that magnitude.”⁷⁰⁷

That same year Henry Myers summarized the case for Congressman Udall.⁷⁰⁸

Israel possessed nuclear weapons, probably fabricated from uranium. While the source of uranium is uncertain, NUMEC would be high on the list of potential candidates. Safeguards at NUMEC were insufficient to protect against relatively sophisticated diversion schemes... . The 93.8 kilograms disappeared either via unknown mechanisms or it was diverted. (Since a major and unsuccessful effort was made in the mid-1960s to explain how the 93.8 kilograms might have been lost in the course of processing, it is unlikely that a convincing explanation will emerge at this date. On the other hand, in the absence of hard evidence of a diversion (i.e., a believable statement by a person who knows), it is unlikely that more than a circumstantial case will be made in support of the diversion theory.)

In 2007, Meyer said, “Israel had the motive, the opportunity, and the capability to obtain HEU from NUMEC.”⁷⁰⁹

James Connor, onetime AEC staff member and then Secretary of President Ford's cabinet in 1976 when the third FBI investigation was commissioned, told John Fialka "You could look at all the documents and ask yourself whether something had happened here. The answer was probably yes. Then the question was whether you could do anything about it, and the answer was no."⁷¹⁰

The CIA maintained from 1968 to at least 1977 that Shapiro aided the Israeli nuclear weapons program. Confirmation of CIA's conclusion is provided by the testimony of the NRC employees who attended Carl Duckett's briefing in February 1976. Their recollections of that briefing, as related to NRC investigators in January 1978, are provided below.⁷¹¹

Former NRC Chairman William Anders said, "he reminded [newly elevated NRC Chairman] Rowden that the commission should be careful not to make flat statements on the question of theft or diversion and that Rowden agreed with him."

Marcus Rowden, the former AEC general counsel and then NRC commissioner and chairman, said, "There were those who held views, based on the circumstantial evidence, that there was a possibility of diversion, and ... others disagreed."

Commissioner Richard Kennedy, a former NSC staffer, said that if he were asked about the evidence of a diversion, he would say, "I have no conclusive evidence of any diversion; that does not suggest I have evidence. There are surmises, rumors and speculations that there have been diversions."

Commissioner Victor Gilinsky, a former Rand Corporation analyst, when asked why the commission could not say there was no evidence of diversion or theft, responded, "Because there is evidence."

Commissioner Edward Mason, the former chairman of nuclear engineering at MIT, said, "While he was not personally persuaded that such a theft/diversion had taken place, the CIA briefing did suggest to him that it might have happened."

General Kenneth Chapman, the former director of NRC's Office of Nuclear Material Safety and Safeguards, said, "after the briefing ... he had no evidence of diversion. If the subject of 'conclusive' or 'hard' evidence was ever discussed, he was not party to it." He added that he and Builder discussed the relevance of the briefing. "Essentially their position was (based on what they heard) if there had been a diversion they thought it must have been done under sanction by U.S. Government officials at a very high level ... and would not be relevant to the development of a safeguards security system." Later, Chapman told Barbara Newman, when interviewed on National Public Radio, "Duckett simply said having investigated it, they [CIA] had been unable to find hard evidence that would be useful in prosecuting the people involved."

Carl Builder, the NRC director of safeguards who came from Rand Corporation, philosophized, "because you cannot prove a negative ... we cannot prove to you that nothing has ever been taken ... one could say there is evidence that material could have been stolen, but [I] would have challenged this statement."

Benjamin Huberman, the former director of NRC's Office of Policy Evaluation, theorized "Either of two statements would be accurate: (1) We have no evidence that a

theft or diversion has actually taken place; or (2) We have circumstantial evidence that a theft or diversion might have taken place.”

Former NRC General Counsel Peter Strauss said he, “got the impression that the CIA had a fairly strong belief that the inventory discrepancy represented material taken to Israel... . If the CIA’s information was accurate, there was a strong circumstantial case—missing material, motive and opportunity... . [I] would not personally say there was ‘no evidence,’ and believe each of those who heard the briefing should pause before making such a statement... . If one meant hard conclusive evidence, admissible in a judicial trial, then one could say there was none... . In a more colloquial sense, and in terms of its regulatory responsibilities, the NRC could, however, characterize the briefing as giving evidence.”

John Davis, the deputy director of NRC’s Office of Inspection and Enforcement, said, “if asked ... he would respond that he knew of no facts which clearly established that any significant quantities of material had been diverted out of the plant.”

Bryan Eagle, the former executive assistant to Chairman Rowden, stuck with “no evidence of a diversion.”

In 1978, when asked by NRC’s Executive Director for Operations Lee Gossick “Do you have evidence of diversion?” CIA Associate Deputy Director for Operations Theodore Shackley responded, “We would say that there is no hard evidence, but a series of events and facts led to our intelligence conclusion that a diversion was a likely possibility.”⁷¹²

The Comptroller General, head of the General Accounting Office of the United States, at the request of Congressman John Dingell, looked into the extent and content of intelligence and nuclear safeguards information regarding a possible diversion from NUMEC.⁷¹³ Because the FBI and the CIA denied GAO access to documentation, the investigation “had to rely, for the most part, on oral evidence obtained in interviews with knowledgeable individuals and staff.” The GAO assessed whether the investigations of the incident by the federal government were adequate and concluded they were “uncoordinated, limited in scope and timeliness and, in GAO’s opinion, less than adequate.” With these limitations, the GAO concluded: “Based on the totality of GAO’s inquiry, we believe that the allegations have not been fully or adequately answered... . GAO believes the important thing is to use the lessons learned from the NUMEC experience to make certain that the Nation develops an adequate detection and follow-up system to deter future nuclear thefts or diversions.”

In 1977, TV journalist Mike Wallace interviewed Israeli Prime Minister Menachem Begin on the CBS News program *60 Minutes*. Wallace asked Begin if he could shed any light on rumors that in the early 1960s Israel had stolen bomb-grade uranium from the United States. Begin replied, “From time to time, I read in the press the most fantastic stories—how everywhere Israel snatches away uranium from America and Europe. It belongs to the James Bond stories—” Wallace interrupted, “Not so?” Begin answered, “I

don't pay attention to them." The casual listener might have thought Begin denied the allegation. However, careful readers of this account will note that Begin implied that NUMEC was no more credible than the Plumbat affair ("snatches away uranium from America and Europe"). Since no one today doubts that Plumbat occurred, essentially as described herein, Begin's words, instead of ducking, might have confirmed the allegations about NUMEC.

In June 1979, Congressman Morris Udall answered in his own inimitable way the question of whether a diversion occurred. Udall was a lawyer by training and well versed in the evidence available at the time because of his committee's investigation of the NUMEC allegations. Udall told BBC reporter Tom Bower,⁷¹⁴

It seems generally conceded in the intelligence community ... that the Israelis have the bomb and have had it for a number of years. It appears they achieved this capability at about the same time that some of the uranium was missing in the United States. So there is a temptation to draw conclusions from this, but there always seemed to be a feeling among the investigators of "I hope I don't find something and maybe this will all go away." And it was not pursued, in the days when the trail was a little more warm, with the kind of vigor that I would like to have seen... . If someone had me write in an envelope whether a diversion occurred or did not occur and that I would be put to death if I answered wrong, I suspect I would have to put in the envelope that I believe there was a diversion.

In 1991, based mainly on the mistaken impression created by Shapiro and Seaborg that the missing uranium at Apollo was found during its decommissioning, Seymour Hersh exonerated Shapiro of the allegation that he participated in a diversion. Hersh's book about the Israeli bomb also noted the connection between Rafi Eitan, the head of LAKAM, and Jonathan Pollard.⁷¹⁵ However, despite more than a dozen references to LAKAM and Eitan in his book, Hersh did not mention the well documented fact that the same Israeli spy agency and the same superspy (Eitan) involved with the Pollard affair also were involved with NUMEC.⁷¹⁶ In any event, Hersh concluded,

Zalman Shapiro did not divert uranium from his processing plant to Israel, but there is little solace for the nuclear industry in that fact; the missing uranium was not stolen at all—it ended up in the air and water of the city of Apollo as well as in the ducts, tubes and floors of the NUMEC plant. There is little solace, too, for the American intelligence community in Shapiro's noninvolvement with nuclear diversion, for it failed to learn of Shapiro's close ties to Ernst David Bergmann and Binyamin Blumberg and the sensitive—and legitimate—mission he did conduct for his beloved Israel.

Hersh did not explain what "sensitive and legitimate mission" Shapiro "did conduct for his beloved Israel." If it was not diversion of uranium, was it espionage? Furthermore,

Hersh erred in saying the “American intelligence community ... failed to learn of Shapiro’s close ties to Ernst David Bergmann and Binyamin Blumberg.” Contrary to this assertion, it is possible to say with certainty that the American intelligence community (which included both AEC and FBI) knew of the connection between Shapiro and Bergmann since both men served on the board of ISORAD, the joint venture between NUMEC and the Israeli AEC. Their association in ISORAD is what led AEC to request the first FBI investigation of Shapiro, i.e., to determine if he should have registered as an agent of a foreign government. But arguing over who knew what about Shapiro’s involvement with Bergmann and Blumberg is beside the point. The point is that Shapiro admitted his association with and admiration of both men, two of the most knowledgeable people in the world of the association between the Israeli nuclear weapons program and the Israeli intelligence apparatus.

In 2001, in his third and final memoir, Seaborg relied mainly on Seymour Hersh’s mistaken conclusion that the uranium found at Apollo during decommissioning made up for the amount that was unaccounted for in the 1960s. Seaborg went on to say, “Interestingly, the CIA seized on this missing-uranium fantasy to decide, for erroneous reasons, that Israel possessed nuclear weapons.” From historic records, it is now known that Israel did have nuclear weapons in the late 1960s, and the missing uranium was a reality, not a fantasy.

While chairman of the AEC and after he left government service, Seaborg covered up the NUMEC affair, downplayed its importance and ameliorated its consequences to Shapiro. On February 14, 1966, the Seaborg-led AEC decided on a policy of secrecy and denial that would taint America’s nuclear enterprise for years. The facts pointed to a conclusion that the 93.8 kilograms of U-235 in the form of HEU probably went to Israel. The only thing that countered those facts was Shapiro’s denial that it happened. Seaborg schemed with his fellow commissioners to keep news from reaching the press about AEC’s discovery of the HEU that could not be accounted for at Apollo. He joined the other commissioners in managing the information that they presented to the Joint Committee. Later, when J. Edgar Hoover concluded that Shapiro’s activities and affiliations were counter to the national interest, Seaborg resisted Hoover’s recommendation to remove Shapiro’s Q clearance and cancel his classified contracts. Still later, when Shapiro requested an even higher clearance, Seaborg personally sought out senior leaders in government, including cabinet members and the DCI, to find a way to deal with the request without holding a public hearing as the attorney general was insisting.

While these matters were pending and immediately before an interview of Shapiro by AEC’s security chief, Seaborg met privately with Shapiro, off the record. When Seaborg could not find a way to deal with the clearance upgrade in private, he marshaled a search that landed a new job for Shapiro, one that did not require an AEC clearance.

Seaborg authored three memoirs after retiring from the government. In each one, he addressed the NUMEC allegations and defended Shapiro, saying there were benign explanations for the missing HEU. In one of the memoirs, he dismissed the importance of resolving the NUMEC matter by asking what good it would do for the United States to

admit that a diversion had occurred. He erroneously concluded in another memoir that it was impossible to divert HEU at Apollo because of security that existed at the time. He cited an NRC study to support his position even though that study reached the opposite conclusion.

Earl Hightower, AEC's assistant director for safeguards and security in the mid 1960s, told the FBI in the late 1970s that Seaborg's close friendship with Shapiro led to AEC largely ignoring NUMEC's violations of AEC's rules.⁷¹⁷ Hightower's recollection of the close relationship between the two men jibes with Seaborg's sending Shapiro an inscribed copy of his memoir and Shapiro's reply offering "many, many thanks and warmest best wishes" for Seaborg's "treatment of l'affair NUMEC."⁷¹⁸

Benjamin Loeb co-authored two of the three memoirs in which Seaborg addressed NUMEC. In the marginalia of a draft of one of those memoirs,⁷¹⁹ Seaborg scribbled a question to Loeb, "Am I trying too hard on these pages to argue NUMEC's case?" Ever the innocent, Seaborg had a way of undercutting his own purposes. Ever the faithful servant, Loeb neither replied nor changed the draft.⁷²⁰

In August 2009, Shapiro revived the question of whether a diversion had occurred. With the assistance of his pro bono attorneys at Arnold and Porter, Shapiro gained the ear of U.S. Senator Arlen Specter (D-PA) who wrote to the NRC asking it to reexamine the case in light of the amount of uranium recovered during decommissioning of the Apollo plant. In Specter's words, "Dr. Shapiro is requesting that the Nuclear Regulatory Commission issue a formal public statement confirming that he was not involved in any activities related to the diversion of uranium to Israel."⁷²¹

On November 2, NRC's Executive Director for Operations William Borchardt responded to Senator Specter. "Accordingly after a thorough review of its records, NRC found no documents that provided specific evidence that the diversion of materials occurred. However, consistent with previous Commission statements, NRC does not have information that would allow it to unequivocally conclude that nuclear material was not diverted from the site, nor that all previously unaccounted for material was accounted for during the decommissioning of the site."⁷²²

In 2010, Victor Gilinsky and I wrote an article for the *Bulletin of the Atomic Scientists*.⁷²³ We reviewed the NUMEC information that had by then become available and concluded,

The circumstantial evidence supports the conclusion that the HEU ended up in Israel. It seems to us self-evident that if the federal government knows something about how NUMEC and/or Shapiro helped Israel get the Bomb, the public has a right to know the details. A good starting point would be to declassify key CIA and FBI documents pertaining to the NUMEC case. Perhaps the most worrisome aspect of the NUMEC affair is that the government itself did not seem to want to find out what happened because it feared the answer. In his last book,

Adventures in the Atomic Age, Seaborg defended this head-in-the-sand approach by questioning “what sense” it made to pursue the case. For our part, getting at the truth makes sense enough.

Columnist William Sweet, writing on “What’s History and What’s Not” in *Foreign Policy Blogs Network*, said he believed that 2010 article proved the case for Israeli theft “beyond any reasonable doubt.”⁷²⁴

In 2004, Gilinsky criticized Avner Cohen for failing in his book to address the NUMEC affair, the Plumbat affair and the Vela satellite detection of the 1979 Israeli/South African nuclear weapons test. In particular, with reference to NUMEC, Gilinsky noted the CIA briefing of the NRC commissioners in 1976.⁷²⁵ Cohen responded later that by the time he wrote his book (1992-1998) he had “very little tangible evidence on NUMEC and Plumbat, so I decided that as a careful historian I should not go into those highly speculative areas.”⁷²⁶

In 2010, Cohen published a second book about Israel and the bomb.⁷²⁷ Unlike his earlier writings, this book acknowledged the Plumbat affair and the suspicion by senior U.S. government officials that Israel’s first nuclear weapons were fueled by uranium from NUMEC.

The intelligence reports that led senior officials to these conclusions are still classified, but we know of the many telltale signs showing that Israel was on the brink of a nuclear-weapons capability. Among the known evidence was its purchase of huge quantities of uranium, such as the 1968 “Plumbat affair,” involving the diversion to Israel of a large quantity of yellowcake (i.e., uranium oxide). Also telling was information about nuclear-related aerial exercises, the development of the MD-620 missile, and the sites that the Israelis had prepared for them. Top officials like Helms and Laird were convinced of the significance of intelligence about the alleged diversion of highly enriched uranium (HEU) to Israel from the Nuclear Materials and Equipment Company (NUMEC) of Pennsylvania. Nevertheless, the intelligence was still tentative, partial, and less than conclusive.

Reed and Stillman were similarly “less than conclusive” about NUMEC.⁷²⁸

Bomb building and plutonium production require uranium. The Israelis hoped to produce enough from phosphate deposits in the Negev, but in the late 1950s the French agreed to provide the uranium needed for the reactor under construction. As time went by, the Israelis began to import yellowcake ore from Argentina and South Africa, but some feel that a windfall of enriched uranium, more than two hundred pounds, came from an Israeli sympathizer in [Pennsylvania]. In 1965, Zalman Shapiro’s NUMEC Corporation, a reprocessor of reactor components, seems to have misplaced 206 pounds of enriched uranium. Mr. Shapiro

had many business and personal connections with Israel; key CIA officers were convinced the missing material was the basis for Israel's initial 1967 A-bomb assemblies. These charges against Mr. Shapiro were never proven; the disappearances were claimed to be standard industrial losses.

Reed and Stillman went on to describe the "better documented disappearance" in 1968 of the Plumbat uranium, which "gave Israel enough uranium to make it through the 1960s." However, after reading the aforementioned "Revisiting NUMEC" published in 2010 in the *Bulletin of the Atomic Scientist*, Thomas Reed said, "I wish we had that in hand when we wrote *Nuclear Express*; we probably would have taken a harder line."⁷²⁹

Peter Stockton, leader of Congressman Dingell's investigation of the diversion, was most succinct. "Shapiro did it."⁷³⁰ He was almost as succinct with journalist Scott Johnson in 2015. "I tend to think it happened, in fact I'm damn sure it happened."⁷³¹

Investigative journalist Gordon Thomas, whose writings explore Israeli intelligence operations, provided another version of the NUMEC story. He said Rafi Eitan picked out NUMEC's Apollo facility because of its poor material accounting and security and then stole highly enriched uranium without Shapiro's knowledge. Despite some shortcomings in Thomas' rendering of events, others have shared his opinion that the uranium found at Dimona might have come from Apollo without Shapiro's direct assistance.⁷³²

Gilinsky and I wrote a second article for *The Bulletin of the Atomic Scientists* in April 2014. It was occasioned by the release a month earlier by the Interagency Security Classification Appeals Panel (ISCAP) of partially declassified government documents that shed additional light on the NUMEC affair. Based on our review of the newly declassified documents, we concluded the following.

While we still don't know *exactly* what the CIA told high government officials, we do know from the released memoranda that top officials thought the CIA's case was a strong one. Also, as described in our earlier article, one of us was present at the CIA's February 1976 briefing of a small group at the Nuclear Regulatory Commission (NRC). At that session Carl Duckett, then-CIA deputy director for science and technology, told the NRC group the CIA believed the missing highly enriched uranium ended up in Israel.

The newly released documents also expose government efforts, notably during the Carter administration, to keep the NUMEC story under wraps, an ironic twist in view of Jimmy Carter's identification with opposition to nuclear proliferation... .

It's fair to ask, in view of the other losses in the U.S. nuclear weapons complex, why the CIA and others singled out NUMEC for grave

suspicion as the source for Israeli bomb-grade uranium. In brief, the reasons are these: NUMEC's unexplained losses were a significantly larger proportion of its throughput of highly enriched uranium than was the case for other firms that dealt with nuclear materials. Sloppy accounting and lax security made the plant easy to rob without detection. NUMEC had commercial relationships with Israel's defense and nuclear establishments and regularly made sizeable nuclear shipments to Israel, which at that time were not checked by the AEC. NUMEC's owners and executives had extremely close ties to Israel, including to high Israeli intelligence and nuclear officials. Israel had strong motives to obtain the highly enriched uranium before it was producing enough plutonium for weapons. High-level Israeli intelligence operatives visited the NUMEC plant. Israeli intelligence organizations were used to running logistically complicated, risky operations to support nuclear weapons development, and it would have been very much out of character for them to pass up an opportunity like this. On top of all this, records show the CIA believed its 1968 environmental sample taken in Israel evidenced an enrichment level unique to Portsmouth.

On August 6, 2014, the *Wall Street Journal* published a story by John Emshwiller about newly declassified documents about NUMEC.⁷³³ It included recent interviews of Zbigniew Brzezinski, John Marcum and Jessica Tuchman Matthews who served in the National Security Council under President Carter and wrote some of the documents that were partially declassified by ISCAP. Emshwiller reported,

The evidence suggested that "something did transpire," said Zbigniew Brzezinski, Mr. Carter's national-security advisor in a recent interview. "But until you have conclusive evidence you don't want to make an international incident. This is a potentially very explosive, controversial issue." Besides, he added, even if a theft was proved, "What are we going to say to the Israelis, 'Give it back?'"

Marcum opined that Carter's diplomatic efforts to produce the 1979 peace treaty between Israel and Egypt probably wouldn't have been possible "if there was some huge scandal at the time about this [NUMEC affair]." Mathews sidestepped Emshwiller's question of whether CIA had found HEU in Israel in 1968. "That's not something that's declassified," she replied, which apparently was a guarded "yes."

A diversion from Apollo could have occurred with or without the knowledge of President Johnson. There were several possible reasons for him to hide a diversion. He might have been

- Expressing empathy for Zionism,
- Avoiding alienation of voters,

- Improving diplomatic relations by granting a favor to Israel,
- Deceiving Israel's Middle Eastern neighbors,
- Balancing power in the Middle East, or
- Avoiding the scandal of a successful diversion on his watch.

Henry Myers said Johnson was simply distracted by the Viet Nam War and did not want to be bothered by what Helms told him. Seymour Hersh had a similar explanation:⁷³⁴

Johnson's purpose in chasing Helms—and his intelligence—away was clear: he did not want to know what the CIA was trying to tell him, for once he accepted that information, he would have to act on it. By 1968, the President had no intention of doing anything to stop the Israeli bomb, as Helms, Duckett, Walworth Barbour, William Dale,⁴⁵ and a very few others in the U.S. government came to understand.

Rafi Eitan responded to questions about NUMEC several times. In the early 1990s, Peter Stockton met him in East Germany to discuss the case of Israeli General Rami Dotan. The General had plea-bargained a 13-year stint in an Israeli prison after being caught in receipt of \$10 million in bribes and kickbacks from American defense contractors. U.S. investigators suspected Dotan was laundering the money for use in intelligence operations.⁷³⁵ Consequently, Congressman Dingell threatened to stop American military aid to Israel. That is when Eitan asked to meet with Stockton to discuss the Dotan case. In 2009, Stockton recalled, "Rafi is a great storyteller. He told me how he captured Eichmann. He wanted Dingell to intervene in the Pollard case. I said no fucking way. Then I said 'Come on Rafi, what about NUMEC?' He said 'What is NUMEC?' I said 'we have your fingerprints all over NUMEC; you went there a couple times. Did you steal the uranium at NUMEC?' He replied, 'Oh, that NUMEC, I don't know anything about that.'"⁷³⁶ In 2015, Stockton told journalist Scott Johnson about this same meeting. "But when Stockton asked about NUMEC, Eitan grew quiet, before saying, 'I've never been to NUMEC. I don't know what you're talking about.' Stockton kept pushing. 'I said, that's bullshit; you know we have your signature [on the AEC documents]' And then he said, 'Well, OK, I was there ... but I was getting batteries for listening devices.'"⁷³⁷

John Emshwiller of the *Wall Street Journal* received a similar reception from Eitan when he brought up NUMEC in a telephone interview in the summer of 2010. Eitan denied any connection with a diversion; said he was at NUMEC in 1968 to discuss surveillance equipment; and said he loved America, "the second greatest country in the world."⁷³⁸

On October 3, 2015, the *Jerusalem Post* published an interview of Eitan. It was a human-interest article, chronicling the life of the 88-year-old man that "has been at the heart of the Israel story since before the creation of the state."⁷³⁹ The story had extensive quotations of Eitan extolling the accomplishments of his life, including the following summary paragraph.

He continued his career in Mossad, heading or involved in many secret

operations—some public knowledge today, others never acknowledged. These included unmasking Israel Beer, a Lieutenant Colonel in the IDF found to be spying for the Soviet Union; thwarting German armaments sales to Egypt; involvement in the diversion of highly enriched uranium from an American nuclear fuel plant (“The Apollo Affair”); advising the British MI6 on counterterrorism operations in Northern Ireland; helping Moroccan ruler King Hassan II to make a political rival in Paris “disappear”; and planning the Israel Air Force attack on the Iraqi Osirak nuclear reactor in June 1981.

During an interview by Avner Cohen in 1992, Avraham Hermoni offered his opinion on whether a diversion occurred. Cohen recently recounted that interview.⁷⁴⁰

Avraham Hermoni was perhaps my best source. I met him about a dozen times. We became friends over time, and he shared with me a great deal of information, including many sensitive issues that I never published. In retrospect I believe that Hermoni really trusted me and in a sense he wanted me to be the carrier of his legacy to future generations. Officially, Hermoni was the science attache at the Israeli embassy in DC in the period 1968-1972, which meant that he was the LAKAM Liaison (spymaster) in the United States, reporting to LAKAM chief, Binyamin Blumberg. It was in one of those meetings, after Hermoni already treated me as a trusted friend, that, at the end of that meeting, Hermoni took me to his study—the main interview was always in his large dining room, next to the kitchen—and showed me some memorabilia from Zal Shapiro and told me that “a great deal of injustice was made to my friend Zal Shapiro, and it cost him a great deal.” Hermoni added, “Zal Shapiro was a great friend of Israel in many ways, he helped and advised us a great deal, but he did not divert nuclear stuff to us. I want you to know that.” I recall that Hermoni was quite emotional when he said that. I must also add that this was the only time that I wondered to myself whether this was the full and complete truth. I recall vividly thinking whether I should believe him on that or not. And this was also one of the reasons why I have been silent on NUMEC.⁴⁶

In 1978, during the administration of President Carter, CIA officer John Hadden came to an opposite conclusion from his Israeli counterpart, Avraham Hermoni. Hadden was circumspect to avoid violation of security classifications or his CIA oath of secrecy, but it is clear what he thought.⁷⁴¹

A crime was committed ten or twenty years ago; a crime considered so serious that for its commission the death penalty is mandatory and no statute of limitation applies. The appropriate authorities became aware of the circumstances of the crime at the time it was committed but

excused the man involved on grounds of carelessness for which he was punished by a heavy fine.

If the crime had been committed intentionally and was not the result of carelessness, then the circumstances warranted a finding of high treason with the mandatory death penalty.

The fine did not persuade other authorities with interests in the same area of activity that the act was unintentional.

A number of years passed. Various investigations were undertaken. For a variety of reasons, the authority which made the original finding of carelessness refused to consider or to aid further investigation.

Information presently available permits the making of a strong case for the presumption that the crime of high treason against the state has been committed.

The crime is of such a nature that the authority directly concerned as well as the government itself will be embarrassed as the crime could only have been committed through gross incompetence on the part of those responsible for security in certain areas.

It is also possible that there will be domestic political uproar, which may affect support for the administration by a powerful element of the population.

It is also possible that if the case is pursued and the findings become known to the public, the government may have difficulty in persuading other nations to adopt certain policies which we consider important and which they may not find convenient or palatable.

There is therefore great resistance on pragmatic grounds to further investigation.

When I think of what we have been discussing in the above terms, I conclude that we should not obstruct the course of justice in a case of this nature. To permit high treason to go unpunished to avoid embarrassment or to make the pursuance of government policy less difficult is a crime in its own right.

In my own case, the above comments are sufficient to decide between the only two choices: to do nothing or to make every effort to establish guilt or innocence of those involved.

An exhaustive investigation aimed at establishing the facts to the very best of our ability may, even at this late date, uncover elements in or out of government who abetted the original act of treason. Even if they cannot be brought to justice, steps can be taken to remove them from positions of trust and thereby prevent them from further betrayal or otherwise damaging our interests.

This same investigation may also define the weaknesses in our security

practices in a sensitive area. By discovering the techniques used in penetrating our government we can more easily protect ourselves in the future from similar injurious action undertaken against us by outsiders of all stripes.

Earnest and serious efforts to get to the bottom of this affair now may save our political leadership embarrassment in the future—embarrassment perhaps even greater than that which may be caused by the realization of the laxity of our security procedures. Not only will the public become aware of the incompetence of certain officials or branches of the government in the past, it will also become aware of the pusillanimity of our political leadership in not making every effort to get to the bottom of this matter once they became aware of the situation.

I would like to close by repeating the kernel of thought, which underlay my short conversation with you in your office. We are dealing here with a continuing conspiracy of a community located both within and without our body politic. It involves patriots of the Nathan Hale variety—not criminals of the ilk of Rosenberg and Philby. It behooves anyone acting in this atmosphere to be most circumspect. I would despair of any success attending further action in this case if any members of the community involved were to become aware of the height of any renewed interest.

It is likely that Hadden sent these words to one or both of the chairmen of the Congressional oversight committees (Udall and Dingell) and to the DOE Inspector General who summoned him to Washington in 1978. His conclusions and recommendations are strengthened by the additional information that has emerged since that time. None of the evidence that has emerged since then detracts from his conclusions.

It is clear that motive, opportunity and means for a diversion from Apollo to Israel were all present. The motive was immeasurable assistance to Israel, a U.S. ally and a sacred cause of Zalman Shapiro, in preparing to defend itself against attack by neighboring states with overwhelming numerical superiority. Opportunity was provided by the oddly sloppy material accounting practices at NUMEC and the rules of AEC that allowed simple and reasonable payments for missing material, no questions asked. The means included the ease of handling HEU when appropriately packaged and the ready availability of shipments to Israel in approved radioactive shipping containers, personal suitcases or even diplomatic pouches, whose contents were not subjected to third party inspections. The means also included the possible assistance of a highly placed insider and the absence of creditable security at the Apollo plant.

If Seaborg, Duckett, Shackley, Starbird, Knauf, Anderson, Hersh, Fialka, *Newsweek*, Weissman and Krosney were correct in their statements about the discovery of highly enriched uranium with a Portsmouth signature near Dimona in 1968, that was convincing evidence, not just circumstantial evidence, of a diversion from Apollo.

If the Justice Department had enough evidence to prosecute Shapiro, it would have done so. Instead, without relying on the information it obtained through questionable means of surveillance, FBI could only muster enough evidence for Hoover to recommend reducing Shapiro's opportunity to commit espionage, i.e., removing his security clearance and his company's classified contracts. The AEC rejected even those limited recommendations.

Evidence that emerged after the original investigations adds credence to the idea that something happened at NUMEC, and not just the diversion of weapons-grade uranium. The evidence includes not only the Portsmouth HEU, but also the unresolved eyewitness account of suspicious activity on the uranium plant dock in 1965, extensive contacts between Shapiro and confirmed Israeli spies and Hadden's numerous revelations about the extent of Israeli nuclear espionage.

When viewed fifty years after the fact, AEC's coverup of NUMEC had an enduring effect on the moral authority of the United States to promote restraint in the acquisition of nuclear weapons. In addition, if Seaborg's statement about "what good would it do." reflected the attitude of the AEC commissioners at the time, it is no wonder President Ford and Attorney General Levi asked FBI to determine if someone in authority had covered up a diversion. John Fialka said it this way: "The scariest possibility in the whole scary area of SNM safeguards is ... if something happens to nuclear materials that is profoundly embarrassing to the state, it will be self concealing."⁷⁴²

The blame for failing to tell the truth about Apollo lies with the U.S. government. The government started the lie when it failed to face the truth about the amount of HEU that was missing from Apollo in the period 1957 to 1968 and the associated circumstances. The deception continued for nearly a half-century because of the government's refusal to acknowledge that proof of the theft was provided by clandestine means in Israel and perhaps by an eyewitness. The most important deception has been the failure to confront the implications of those discoveries. Just as NRC said it must assume the diversion occurred and take steps to ensure it would not happen again, so the entire U.S. government should acknowledge that it happened or could have happened and take steps to guard against it happening again.

Because the issues are moral, not technical, political or organizational, they require telling the truth. The United States needs to be trusted if it is to lead the world out of the current morass of nuclear proliferation. Therefore, its leaders must begin by telling the truth. Udall showed more courage than others when he joined Carl Duckett and John Hadden in shining light down this dark tunnel.

This chapter recounted the conclusions about NUMEC by the major participants in the saga. However, there is a nagging loose end that none addressed. It concerns a possible eyewitness account of a diversion that a former employee of NUMEC provided to the FBI via the NRC in 1980. He told of a suspicious shipment from Apollo, late one night in early 1965, of canisters normally used for highly enriched uranium. The suspicious shipment allegedly happened around the time when AEC discovered 93.8 kilograms of U-235 in the form of HEU were missing. The story involved an armed man on the dock at a time when

the company employed no armed guards. The details in the statement by the eyewitness were convincing, including the shipping manifest for an Israeli shipping line. But questions remain: Did the witness really see what he described? Was he really warned the next day to never speak about what he saw? Was that warning corroborated with the person who made it? Why is there no record of FBI discussing this late-breaking information with Zalman Shapiro, who the eyewitness claimed was present? Who were those people on the dock? Did FBI communicate this information to the Justice Department? The NRC? What did Justice or NRC do with it? Did the FBI close this lead or ignore it? There may be simple answers to such questions, but some FBI documents from that period are entirely redacted. Now, more than 50 years after the event this eyewitness described, how are we to know if we can trust his statement or if we can trust the FBI if our government stubbornly, apparently without just cause, maintains its secrecy?

⁴³ Baron was then a special assistant to the attorney general. During the Clinton administration, Attorney General Janet Reno selected Baron to head the Office of National Security in the Justice Department.

⁴⁴ John C. “Jack” Keeney joined the Department of Justice as a lawyer in 1951 and served there until 2010, under 12 presidents and two-dozen attorneys general. He was the longest-serving federal prosecutor in history, served for decades in the criminal division, and occasionally served as acting assistant attorney general.

⁴⁵ William N. Dale served as Barbour’s deputy chief of mission at the U.S. embassy in Israel starting in 1964. He worked with the embassy’s science attache and the CIA station chief John Hadden in monitoring Dimona. Hersh described Dale’s role and accomplishments, including his assessment of the change in attitude of the U.S. government towards Dimona in the Nixon administration.

⁴⁶ For further information about Avraham Hermoni, including the text of the interview that Cohen conducted with him in 1992, see “Avner Cohen’s Collection” at <https://www.wilsoncenter.org/avraham-hermoni>.

Chapter 19

Toward a Deeper Understanding

The 50-year history of NUMEC is replete with denial and deception. Facts have been hard to come by. The ubiquitous need to know, the closed doors of meetings, the classified records of investigations and the redactions of sources and methods have veiled the truth and created a mystery. The foregoing account attempts to unravel the mystery with what is known.

The main reason for going to the trouble to lay out what is known in some semblance of order, including facts published for the first time, despite the confusion created by piecemeal and protracted releases of information, is to ensure that the essential features of the story are not forgotten. Nuclear technology, like all human endeavors, should strive to avoid past mistakes.

The central lesson from the foregoing account is that whether the diversion of HEU and the transfer of sensitive technology happened or not, they clearly could have happened. If the proliferation of nuclear weapons is to be slowed or halted, the lessons learned from the NUMEC experience must be heeded. More than that is needed, of course, but it would be tragic if these lessons have to be relearned.

It is tempting to stop here, put the NUMEC story aside and move on. However, there is more to be harvested from the experience. Extended consideration of the matter leads to deeper understanding in several areas. This chapter briefly summarizes three of those areas, as follows:

1. The NUMEC experience shows that dual loyalties make the control of nuclear weapons technology harder than normal.
2. The Israeli policy of nuclear opacity impedes progress towards a nuclear-weapons-free Middle East.
3. Arbitrary secrecy blocks citizens' rights and abilities to assess their government's actions.

Dual Loyalties and the Control of Nuclear Technology

America is home to bright foreign students from all over the globe, enjoying greater freedoms, ethnic diversity and Internet access than anywhere else. They earn scientific degrees, invaluable experience and standing in their technical communities, including the nuclear community. The same kinds of people no doubt train and reside in Belgium, Brazil, Great Britain, Canada, China, France, Germany, India, Israel, Italy, Kazakhstan, South Korea, Pakistan, Russia, Sweden, Taiwan and Ukraine, to name a few. These and other nations have access to the technology that underlies nuclear medicine, nuclear power and nuclear weapons. As they are able, most of these nations and others less developed will choose to utilize nuclear medicine, many will opt to use nuclear power and some will choose nuclear weapons. The spread of the technology cannot be stopped. It has already happened. The basics are on the world-wide-web, while the specifics are well within the capabilities of highly skilled scientists from most nations in the world, all of them born

and raised in the era of globalization. No nation that seeks nuclear weapons will be thwarted by the unavailability of willing physicists. In fact, history teaches that some of these people will consider their homelands as sacred havens even as they enjoy the abundance of the technologically advanced nations. Human nature and statistics guarantee that dual loyalties will arise. When they do, answers blur to the question of what is the right thing to do.

Victor Gilinsky pointed out that scientists like to see their ideas work in the real world, like some scientists from the Manhattan Project who cheered the successful bombings of Hiroshima and Nagasaki. He quoted Herb York, former director of Livermore National Laboratory, to the effect that it is difficult to control the spread of nuclear weapons because those devoted to pursuing them are mostly sincere people acting in good faith. They believe in what they are doing, and many of their predecessors became famous for their efforts in many different countries, not just America and Russia.⁷⁴³

Realization of this vulnerability led to a common saying about nuclear technology, “The genie is out of the bottle.” It symbolizes a way of looking at nuclear proliferation, i.e., we cannot go backwards—once human beings learn how things work, they cannot unlearn them. Furthermore, it is good to try but impossible to completely secure knowledge with barbed wire and encrypted computers. People talk and the walls have ears.

Former FBI Director Louis Freeh described his frustrations in dealing with white-collar crime, including the theft of trade secrets, with American laws that are decades out of date compared to the rate of change of technology.⁷⁴⁴ He said a surprising number of the Bureau’s cases involve foreign governments, including American allies, who direct their intelligence services at American trade secrets so that companies in other countries might gain competitive advantage. He said that FBI identified forty-three nations that were engaged in such activities using their embassies in the United States as a base of operations. What Freeh describes for America could easily apply to any technologically advanced nation. What he describes for ordinary technology is troublesome enough, but realizing that it also applies to nuclear technology is sobering.

Human frailties, dual loyalties and wide dissemination of scientific capabilities have contributed to the proliferation of nuclear weapons. The trend will continue. The best America can do to control the future is to (1) be vigilant in thwarting unauthorized transfer of nuclear technology and materials while incentivizing other nations to do the same, (2) exert a civilizing influence on the global uses of nuclear energy to advance medical technology and to power economic development, and (3) rely on a kind of international detente until sanity leads to further progress on nuclear disarmament. Following that path, the highest priority is for America to demonstrate, by policy and deeds, its restraint, honesty and moral character in international nuclear affairs. That posture is a certain prerequisite to worldwide elimination of nuclear weapons.

Nuclear Opacity Impedes a Nuclear Weapons-Free Middle East

All sides of the nuclear arms race in the Middle East know about Israel’s nuclear weapons and America’s assistance in their creation, despite Israel’s determined maintenance of its policy of nuclear opacity. A 1987 report by the Pentagon-funded

Institute for Defense Analysis provides an example of the cooperation between American and Israeli weapons designers. Israeli journalist Michael Karpin said the 386-page report exposed “for the first time ever the actual depth of top-secret military cooperation between the U.S. and Israel, including, amazingly, information about Israel’s unacknowledged nuclear program... . The most surprising segment in the report states that the Israelis are ‘developing the kind of [computer] codes which will enable them to make hydrogen bombs.’ In practice, this short expression confirms that in the eighties, Israeli scientists were reaching the capabilities to employ hydrogen fusion, possibly creating the sort of bombs that are thought to be a thousand times more powerful than atom bombs.”⁷⁴⁵

As described in the foregoing chapters of this book, American assistance to the Israeli bomb program was not limited to the NUMEC case or to intergovernmental cooperation. It is now clear that people like Rafi Eitan, Avraham Hermoni and Shimon Peres recruited people like Arthur Biehl, Raymond Fry, David Lowenthal, Arnon Milchan, and Zalman Shapiro to support their program. Even though such assistance occurred in the past, it undermines current American efforts to convince governments in the region to forego weapons of mass destruction. In fact, American aid to Israel’s weapons program and America’s failure to address the threat the weapons pose create incentive for Israel’s neighbors to go nuclear.

In 2007, John Mearsheimer, a political science professor at the University of Chicago, and Stephen Walt a professor of international relations at Harvard, described this effect in their best-selling book on the Israel Lobby,⁷⁴⁶

The irony is hard to miss: the United States has pressured many other states to join the NPT, imposed sanctions on countries that have defied U.S. wishes and acquired nuclear weapons anyway, gone to war in 2003 to prevent Iraq from pursuing WMD, and contemplated attacking Iran and North Korea for the same reason. Yet Washington has long subsidized an ally whose clandestine WMD activities are well known and whose nuclear arsenal has given several of its neighbors a powerful incentive to seek WMD themselves.

In 2014, Victor Gilinsky addressed the need for telling the truth about the Israeli weapons. He cited a March 2013 statement by U.S. Ambassador to the IAEA Joseph Macmanus to a meeting of the IAEA board of governors on “Establishing a Middle East WMD-Free Zone.”⁷⁴⁷ Macmanus said, “The United States regrets the issue of Israeli nuclear capabilities has once again been brought before the Board. Unlike other Member States whose nuclear activities are included in this Board’s agenda, Israel has broken no agreements under the purview of the Agency.” Such statements, although “just within the truth” as Gilinsky noted, surely destroy U.S. credibility and cry out for truth telling.

U.S. complicity in sustaining Israel’s policy of nuclear opacity and its refusal to join the NPT is unabashed. In September 2015, the general assembly of the IAEA voted against a resolution advanced by Egypt and presented by Qatar calling for international monitoring of Israel’s nuclear facilities. The vote was 61 to 43 against with 31 abstentions. The United States voted against the resolution, which called on Israel to join the NPT and to open its nuclear facilities to UN inspectors. Although the resolution called Israel’s nuclear arsenal “a permanent threat to peace and security in the region,” it did not call for

dismantlement of that arsenal, only its monitoring by the IAEA as it does for all other acknowledged weapons states, including the United States and Russia. Prime Minister Netanyahu's office called the vote to defeat the resolution "a great victory for Israel in the international arena."⁷⁴⁸

There is another example of America's unabashed complicity in the policy of nuclear opacity. On September 8, 2015, the *Bulletin of the Atomic Scientists* published an article by nuclear nonproliferation scholar Leonard Weiss entitled "Flash from the past: Why an apparent Israeli nuclear test in 1979 matters today." The article concerns "a likely Israeli-South African nuclear test over the ocean between the southern part of Africa and the Antarctic" called the "Vela Incident" because its first detection owed to a U.S. satellite by that name. In the article, Weiss presented a strong technical analysis, aided by data from national laboratories, to demonstrate that the test involved an Israeli nuclear device and was aided logistically by the South Africans. He also presented a convincing explanation of the political situation that led to a coverup of the test by the Carter Administration, a coverup that endures to the present time. That is, imposing sanctions on Israel would lead to the loss of Jewish supporters for Carter and the Democratic Party. On the other hand, "ignoring an Israeli nuclear test would make for a glaring case of a double standard in US non-proliferation policy." Faced with this dilemma, the government concocted an alternative explanation, aided by distinguished scientists, to cast doubt on the validity of the data surrounding the test, and in some cases to suppress data provided by analysis underwritten by U.S. taxpayers. Over time, that counter explanation unraveled in various ways that Weiss explains in detail, leading him to conclude that Israel acted in violation of the Limited Test Ban Treaty to which it is a party. Weiss' bottom line is very similar to the one that emerged from this study of NUMEC, namely,

Continuing to hide Israel's testing violation is a direct counter to the US claim that it stands for the rule of law and implies that the United States cannot be counted on to defend treaties if they are violated by Israel. This failure fosters cynicism about the seriousness of the United States and its allies on the restraining of nuclear weapons. In the wake of the Iran agreement, it underscores concerns that the United States has double standards on arms control when Israel is involved.

Arbitrary Secrecy Rules Violate Citizens' Rights

Why do the FBI and the CIA still hide truth about NUMEC when much of the truth is already known? What is left to hide? So much time has passed that the people who now guard the secrets have no personal stake in the history they hide. Many of the characters in the affair, its investigation and its coverup have died—Seaborg, Ramey, Teller, Hoover, Mitchell, Johnson, Nixon, Angleton, Duckett, Hadden, Helms, Shackley, Kennedy, Mason, Gossick, Giller, Starbird, Lowenthal, Bendor, Hermoni, Kafkafi, Bergmann, Ne'eman, Udall and Myers. Who is the U.S. government still protecting? Moreover, whether Israel jump-started its nuclear weapons program with HEU from the United States or not, its current nuclear weapons rely on its domestic production of fissile material. Plutonium production efforts at Dimona since the 1960s have trivialized any HEU diverted there from NUMEC. These are some of the reasons that telling the truth should not hurt.

There are other reasons to know the truth. For one, the Army Corps of Engineers recently estimated that cleanup of the radioactive waste burial pits at Parks Township, the pits NUMEC exhumed in 1965 in a futile search for the missing HEU, will cost American taxpayers \$350,000,000.00.⁷⁴⁹ It would be good for taxpayers to know what they are paying for and whether societal good owes to such costs.

Thus, the overarching question is: Why are some aspects of the truth about NUMEC still being hidden by the FBI, the CIA and the Justice Department? In addressing that question, it is useful to ask who would suffer the most damage if rumors and circumstantial evidence congealed into fact?

Aspects of FBI's performance in the NUMEC case helped to perpetuate its coverup. In May 1978, Congressmen Udall and Dingell were leading parallel investigations. Udall asked DOE for documents in its files that were authored by FBI and pertained to the case. In June, Assistant Attorney General Patricia Wald denied his request citing "the difficulty involved in disseminating information concerning a pending and active investigation."⁷⁵⁰ Thus, FBI, with assistance from Justice and DOE, impeded two ongoing Congressional investigations, one by Udall and the other by Dingell. The FBI released those documents in the 1980s, but with heavy redactions. A few have been rereleased since then with fewer redactions. Most of the documents are still in heavily redacted form and essential features of the FBI's investigations and collusions remain hidden from public view.

CIA's complicity in the coverup of NUMEC investigations is obvious by its continuing refusal to declassify key documents that are nearly 50 years old. Not so obvious is CIA's misuse of the labor and integrity of U.S. citizens to accomplish its operations and protect its secrets. Consider the example of Edwin Kintner, an engineer who trained at the Naval Academy and the Massachusetts Institute of Technology, served in the naval nuclear program and became a senior staff member of the AEC in the 1960s and 70s.⁷⁵¹ In the naval nuclear program, at Bettis Laboratory, he participated with Zalman Shapiro in designing the reactor for the world's first nuclear submarine, *USS Nautilus*. After leaving the Navy, Kintner participated in at least two U.S. inspection teams sent to Dimona, one in 1968 and one in 1969. In both cases the inspection teams failed to find the reprocessing facility at Dimona used for producing plutonium.

In January 1994, well after Mordechai Vanunu,⁴⁷ Hersh and others publicly declared that Dimona had been producing plutonium for nearly three decades, Avner Cohen and MIT professor Dr. Marvin Miller interviewed Kintner about his 1968 and 1969 inspections.⁷⁵² When they told Kintner that the CIA knew of the reprocessing facility at Dimona before his inspections he was shocked.

You know what, it seems to me that there was a lot of super-spy kind of things being dreamed up here. Let me ... say again, I have no doubt that the Israelis had the intelligence and the capability and particularly the operation of the reactor to generate a lot of plutonium. I have no doubt they had the technology associated with separating that plutonium out into weapons grade material. But I have a very large difficulty in believing is that, as carefully as we were able to go around

that facility, that processing wasn't done there. Now maybe it was done somewhere else, but once more let me tell you that the satellite photography which was shown us ... and we spent several days at the CIA, it may be true that the CIA was not giving us the whole story either. If that's the case then this country is in serious trouble. Why would they do that? Let me just make one other point. The President of the United States gets an agreement that states such a study will be made and the CIA on its own decides to not give what it knows to the people who are sent over there. Doesn't that sound strange?

Cohen summarized the Kintner interview.

It appears that Kintner and his team were duped twice: once by the Israelis and once more by the U.S. intelligence agencies that did not share all they knew with the visiting team. In retrospect, it may be that the true function of the visiting technical teams was more political than technical, unbeknownst to the inspectors... . Their job was not to verify that what the Israelis were saying was true, but rather they were to be the technical fig leaf for the political facade that Israel was not crossing the nuclear threshold.

Cohen's rendition of the duping of Kintner is reminiscent of NRC's duping of the Conran task force. Generalizing from these two experiences, it is safe to say that our government not only keeps essential facts from its citizens, it also uses its citizens as unwitting foils in perpetuating its coverups.

What Gilinsky and I said in our second article about NUMEC in the *Bulletin of the Atomic Scientists* is a good place to leave this subject of unreasonable security, realizing however that the need for truth telling extends well beyond NUMEC. Democracy does not work when the state unreasonably denies information to its citizens.

Nearly 50 years have passed since the events in question. It is time to level with the public. At this point it is up to the president himself to decide whether to declassify completely the NUMEC documents, all of which are over 30 years old. He should do so. We know that is asking a lot given the president's sensitivity about anything involving Israel, and especially anything relating to Israeli nuclear weapons. But none of his political concerns outweigh his responsibility to tell the US public the historical truth it deserves to know.

In early 2009, former Senator Patrick Leahy (D-VT) urged the formation of a Truth Commission to address the abuses of national security policy that occurred under President George W. Bush.⁷⁵³ Leahy likened the benefits of such a commission to the benefits derived from the Church committee's investigation of abuses by U.S. intelligence agencies in the 1960s and 1970s. Truth Commissions promoted healing in South Africa at the end of apartheid. A Truth Commission on nuclear opacity, including America's 50

years of secret support for Israeli weapons, would do much to restore American and Israeli credibility in matters of nuclear nonproliferation. This could happen only if the so-called Israel Lobby were to stand down so the truth would come out.

Such a Truth Commission on nuclear opacity would be consistent with the aforementioned advice of Avner Cohen who has studied and written more than anyone about Israel's nuclear history and its policy of nuclear opacity. Writing in the *Bulletin of the Atomic Scientists* in 2006, he said, "Set against contemporary values of transparency and accountability, the Nixon-Meir deal of 1969 is now a striking and burdensome anomaly... . It is time for a new deal to replace the old Nixon-Meir understandings of 1969, with Israel telling the truth and in doing so normalizing its nuclear affairs."⁷⁵⁴

⁴⁷ Vanunu was a technician at the Dimona site who told the British press in 1986 about the nuclear weapons work being carried out there. Intelligence agents returned him to Israel where he served 18 years in prison and is still subject to restrictions on his freedoms.

Acronyms

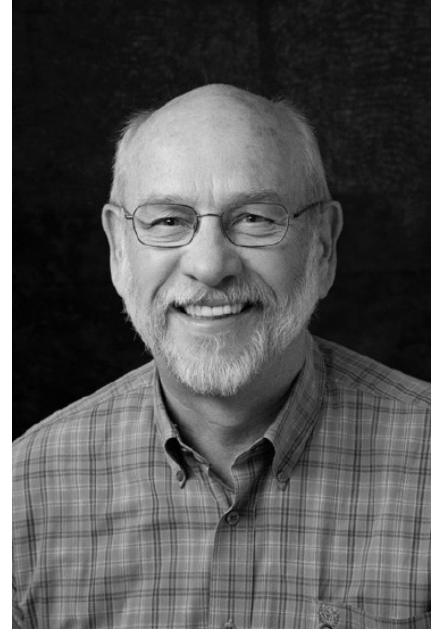
ADDO	CIA's Associate Deputy Director for Operations
AEC	Atomic Energy Commission
ARCO	Atlantic Richfield Company
B&W	Babcock and Wilcox Company
CIA	Central Intelligence Agency
DCI	Director of Central Intelligence
DDO	CIA's Deputy Director for Operations
DDS&T	CIA's Deputy Director for Science and Technology
DOE	Department of Energy
ERDA	Energy Research and Development Administration
FBI	Federal Bureau of Investigation
FMSAC	Foreign Missile and Space Analysis Center
FOIA	Freedom of Information Act
GAO	General Accounting (Accountability after 1974) Office
ID	Inventory difference
IG	Inspector General
HEU	Highly enriched uranium
IAEA	International Atomic Energy Agency
IAEC	Israeli Atomic Energy Commission
ISCAP	Interagency Security Classification Appeals Panel
ISORAD	Israel NUMEC Isotopes and Radiation Enterprises
JCAE	Joint Committee on Atomic Energy
LAKAM	Hebrew acronym for Israeli Bureau of Scientific Relations
MDR	Mandatory declassification review
MUF	Material unaccounted for = ID
NPT	Nuclear Nonproliferation Treaty
NRC	Nuclear Regulatory Commission
NRDC	Natural Resources Defense Council
NSA	National Security Agency

NSC	National Security Council
NSI	National Security Information
NUMEC	Nuclear Materials and Equipment Corporation
ORNL/OROO	Oak Ridge National Laboratory/Oak Ridge Operations Office
RAFAEL	Hebrew for Weapons Development Authority
SAC	Special Agent in Charge (an FBI staff position)
SNM	Special Nuclear Material
WANL	Westinghouse Astronuclear Laboratory

About the Author

Roger J. Mattson was born in Central City, Nebraska a month before the attack on Pearl Harbor. In high school he excelled at playing trumpet and piano. A career in music was close at hand. But in the year of Sputnik 1, inspired by a math teacher, he opted instead for a career in engineering. He graduated with honors from the University of Nebraska and then received advanced degrees from the University of New Mexico and the University of Michigan where he earned a PhD in Mechanical Engineering.

His first job was at Sandia National Laboratory in Albuquerque where he designed reactors for testing nuclear weapon components. He soon accepted an assignment with AEC's regulatory staff in Washington, DC, specializing in safety systems for power reactors. He served as an assistant to AEC Commissioner William O. Doub.



He joined the new NRC in 1975 and developed standards for environmental and radiation protection and safeguards for nuclear materials and facilities. At the time of the 1979 accident at Three Mile Island he was leading the technical review of nuclear power plants for NRC's Office of Nuclear Reactor Regulation. He took a significant role in the response to the accident and the reforms that followed.

Dr. Mattson left NRC in 1984 and led two private companies that provided safety and security services for U.S. nuclear power plants, DOE's nuclear facilities, and several foreign users of nuclear power.

Following the Chernobyl accident in 1986, he helped develop IAEA's guidance on safety principles for the world's nuclear power plants. He oversaw nuclear safety consultancies in five foreign countries. He also served on the offsite safety committees for five nuclear power plants, DOE's Rocky Flats Site, a Los Alamos test program and DOE's Advanced Test Reactor. In 2012, he was part of a team formed by the president of the American Society of Mechanical Engineers to forge a new safety construct for nuclear power plants after the tragedy at Fukushima.

As an engineer with extensive experience in nuclear technology, Mattson understands the design, construction, operation, safety and security of facilities that produce electric power and nuclear weapons. He continues to consult on nuclear power. He and his wife enjoy living in Colorado where they savor the seasons and the mountains. He still plays the piano.

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²⁶⁸ FBI memorandum from C. D. DeLoach to Mr. Tolson, “Dr. Zalman Mordecai Shapiro, Possible Atomic Energy Act Violation,” May 6, 1968, FBI FOIA File No. 117-2564, document 38, labeled CONFIDENTIAL before redaction and release.

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²⁷¹ “The Development of FBI Domestic Intelligence Investigations,” United States Senate Select Committee to Study Governmental Operations with Respect to Intelligence Activities (Church Committee), 1975.

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²⁷³ Notes from telephone conversation with General Delmar Crowson concerning an article in June 13 issue of the *Wall Street Journal*, James Lovett, NUMEC, June 17, 1968.

²⁷⁴ FBI Memorandum from Director to SAC Pittsburgh, June 6, 1968, FBI FOIA File No. 117-2564, document 46, labeled CONFIDENTIAL before redaction and release.

²⁷⁵ FBI Memorandum from Director to SAC Pittsburgh,” Dr. Zalman Mordecai Shapiro, IS – Israel, Atomic Energy act,” September 17, 1968, FBI FOIA File No. 117-2564, document 75, labeled CONFIDENTIAL before redaction and release.

²⁷⁶ “Supplementary Detailed Staff Reports on Intelligence Activities and the Rights Of Americans,” Book III, Final Report of the Select Committee to Study Governmental Operations with Respect to Intelligence Activities, United States Senate, Warrantless FBI Electronic Surveillance, April 23 (Under Authority of the Order of April 14), 1976. Medsger, Chapter 27.

²⁷⁷ Riebling, p. 336-338.

²⁷⁸ FBI Letter from Director to Attorney General, “Dr. Zalman Mordecai Shapiro: Internal Security – Israel, Atomic Energy Act,” February 10, 1969. “Mystery of Israel’s Bomb,” *Newsweek*, January 9, 1978. In 1978, Congress tightened the rules on surreptitious surveillance by passing the Foreign Intelligence Surveillance Act. The law known as FISA required that warrants be obtained from a special court, whose judges were sworn to secrecy, before an American suspected of being a foreign agent could be monitored. The FBI had to show “probable cause” in order to get such a warrant, a Catch-22 that gave suspects the benefit of the doubt, not law enforcement. Until the laws were changed again (the Patriot Act) in the aftermath of the September 11, 2001 terrorist attacks on the Pentagon and World Trade Center, it was easier in some cases for the media and Congress to gather information about suspected spies than it was for the FBI. (See Riebling, p. 149 and 223 and Medsger, Chapter 27.)

²⁷⁹ FBI Memorandum, SAC, Pittsburgh to Director, “Dr. Zalman Mordecai Shapiro: IS – Israel, Atomic Energy Act,” June 13, 1968, labeled SECRET before redaction and release.

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²⁸⁸ *Valley News Dispatch*, a publication of Trib Total Media, August 26, 2002.

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²⁹⁰ Goodwin, Kindle location 4967.

²⁹¹ Cohen 1998, p. 298.

²⁹² "LBJ's Secret Israel Tapes," Johnson, Robert David, *The New York Sun*, May 28, 2008.

²⁹³ Raviv and Melman 1990, p. 3, Blitzer, p. 162.

²⁹⁴ Raviv and Melman 1990, p. 114-115.

²⁹⁵ Raviv and Melman 1990, p. 70-71.

²⁹⁶ Blitzer, p. 10.

²⁹⁷ Raviv and Melman 1990, p. 74; Hersh, p. 130-131; Reed and Stillman, p. 115, 118.

²⁹⁸ Raviv and Melman 1990, p. 74.

²⁹⁹ CIA letter from Director Richard Helms to The Honorable Ramsey Clark, Attorney General, April 2, 1968.

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³⁰¹ "Yuval Ne'eman, Dean of Israeli Scientists, Dies at 80," *Jerusalem Post*, April 27, 2006. Davenport, Eddy and Gillman, Chapter 20. Riebling, p. 247.

³⁰² FBI Memorandum, "Atomic Energy Act," from SAC Washington Field Office to Director, FBI, September 11, 1968, labeled SECRET before redaction and release. AEC Letter from Harry R. Walsh, Director of Security Division in AEC's New York Operations Office, to Bruce D. Rice, Manager of NUMEC Security Division, September 20, 1968, FBI FOIA File No. 117-2564, document 134, unclassified. FBI Memorandum, from SAC Pittsburgh to Director, September 20, 1968, FBI FOIA File No. 117-2564, document 135, labeled CONFIDENTIAL before redaction and release. NUMEC letter to Harry R. Walsh, AEC Director of Security and Property Management Division from Bruce D. Rice, NUMEC Manager of Security, September 12, 1968, FBI FOIA File No. 117-2564, document 144. FBI Memorandum from SAC Pittsburgh to Director, October 17, 1968, FBI FOIA File No. 117-2564, document 164, labeled SECRET before redaction and release.

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- 384 Udall committee staff members formulated this account as documented in the Udall papers at the University of Arizona. FBI records are too redacted to show such details.
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- 388 According to his March 27, 1990 obituary in the *New York Times*, Dr. Siegel was a professor of applied and engineering physics at Cornell University and was involved with high-resolution electron microscopy and molecular biophysics. A 1940 graduate of Massachusetts Institute of Technology with a Ph.D. in physical chemistry, Siegel was

affiliated with Harvard University and Brooklyn Polytechnic Institute and wrote hundreds of articles for professional journals and a book, *Modern Developments in Electron Microscopy*, which was published in 1964.

³⁸⁹ In an interview for the Pittsburgh Chapter of the National Council of Jewish Women in 1988, Dr. Rosenberg described his work with photosynthesis. He immigrated to Israel in 1946 and assisted with the startup of the Weizmann Institute. He came to the University of Pittsburgh in 1952 and became chair of biophysics and microbiology. He served as dean of the school of arts and sciences at the University of Pittsburgh from 1970 to 1986.

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³⁹¹ White paper on NUMEC prepared by Udall Committee staff members, in 1977 after release of DOE papers, p. 108, University of Arizona, Special Collections Library, papers of Morris Udall, MS 325, Box 365.

³⁹² Avner Cohen, personal communication, January 23, 2016.

³⁹³ Seaborg, 1993, p. 200-201.

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³⁹⁸ FBI Letter, J. Edgar Hoover to Honorable Richard Helms, Director, CIA, September 3, 1969, labeled SECRET before redaction and release by the Gerald Ford Library.

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⁴⁰¹ AEC letter from William T. Riley, Director, Division of Security, to J. Edgar Hoover, Director, Federal Bureau of Investigation, October 2, 1969, FOIA File No. 117-2564, document 457, labeled CONFIDENTIAL before redaction and release.

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⁴⁰³ “Briefing Book - Visit of Mrs. Golda Meir,” Memorandum for Henry A. Kissinger, The White House from Theodore L. Eliot, Executive Secretary, Department of State, September 19, 1969, classified TOP SECRET/NODIS before release by the National Archives.

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⁴⁰⁵ “Israel Crosses the Threshold,” Avner Cohen and William Burr, *Bulletin of the Atomic Scientists*, May/June 2006.

⁴⁰⁶ Riebling, p. 255.

⁴⁰⁷ “Soviet Policies in the Middle East and Mediterranean Area,” National Intelligence Estimate 11-6-70, Central Intelligence Agency, March 5, 1970, classified SECRET before redaction and release.

⁴⁰⁸ FBI Internal Report, from [deleted] to [deleted], Subject “Atomic Energy Act; Obstruction of Justice,” May 22, 1979, FBI FOIA File No. 117-2564, document 674, labeled SECRET before redaction and release.

⁴⁰⁹ Office Diary of Glenn T. Seaborg, Chr. USAEC, 1961-72, October 14, 1970, Folder Page 118143, Papers of Seaborg

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⁴¹⁰ Justice Department Memorandum from John F. Doherty, Acting Assistant Attorney General, Internal Security Division, to Director, FBI, "Zalman Mordecai Shapiro," October 29, 1970, labeled SECRET before redaction and release.

⁴¹¹ "Zalman Mordecai Shapiro," Memorandum by Robert E. Tharp, Deputy Director, AEC Division of Security, for H. C. Donnelly, AEC Albuquerque Operations Office, October 30, 1970.

⁴¹² Office Diary of Glenn T. Seaborg, Chr. USAEC, 1961-72, November 3, 1970, Folder Page 119018, Papers of Seaborg Biographer Benjamin Loeb, Manuscript Division, Library of Congress.

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⁴¹⁴ "Discussion with Dr. Zalman Mordecai Shapiro," Memorandum of Record, William T. Riley, Director, AEC Division of Security, December 11, 1970.

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⁴¹⁷ *The Man to See: Edward Bennett Williams Ultimate Insider; Legendary Trial Lawyer*, Evan Thomas, Simon and Schuster, New York, 1991.

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⁴¹⁹ Seaborg 1993, p. 204.

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⁴²⁵ FBI Letter from John Edgar Hoover, Director, to William T. Riley, AEC Director Division of Security, March 16, 1971, FBI FOIA File No. 117-2564, document 498, labeled CONFIDENTIAL before redaction and release. FBI Memorandum from SAC Philadelphia to Director, (subject redacted), September 28, 1971, FBI FOIA File No. 117-2564, document 510, labeled CONFIDENTIAL before redaction and release.

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⁴²⁷ Letter from Zalman M. Shapiro, Westinghouse Power Systems, to AEC Commissioner James Ramey, June 1, 1971, Udall Papers, University of AZ Library.

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⁴³⁰ Helms and Hood, p. 409-412; Powers, p. 299-302.

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⁴⁶³ FBI Investigative Report, by Washington Field Office, DIVERT, May 14, 1976, FBI FOIA File No. 117-2564, document 557, labeled TOP SECRET before redaction and release.

⁴⁶⁴ FBI minutes of May 3, 1976 meeting, Robert E. Tharpe, Deputy Director of Safeguards and Security, Energy Research and Development Administration, May 14, 1976, FBI FOIA File No. 117-2564, document 557, labeled TOP SECRET before redaction and release. AEC Letter, from R. L. Hollingsworth (AEC General Manager) to John T. Conway (JCAE Executive Director), February 14, 1966.

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